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*Keywords:* *exchange rate, economic growth, multilateral exchange rate.*

*GJMBR-B Classification:* *JEL Code: E5, E52, E51*




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# The Impact of Exchange Rate on Economic Growth-Case Studies of Countries in the Asean Region

Pham Thi Ha An [α], Nguyen Thanh Binh [σ] & Ho Le Nguyet Cam [ρ]

*Abstract-* The study reflects the impact of an effective multilateral exchange rate in the 1989-2018 period on the economic growth rate of 5 ASEAN countries, including Vietnam, Indonesia, Singapore, Philippines, and Malaysia. To estimate this model, the author uses the Fixed Effects and Random Effects panel data estimation method. Hausman test shows the model calculated using the Fixed Effects method is more suitable than the Random Effects method. In the estimation model, however, heteroskedasticity and autocorrelation came using the Fixed Effects method. Using Prais-Winsten (PCSE) process, the authors overcame the phenomenon. The final model shows that an improvement of 1% in the effective exchange rate would have a positive impact, growing the five countries' economic growth rate by 16.2%.

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## I. Introduction

Economic growth is an increase in the output scale of the economy over a given period of time. To reflect the growth rate, growth is compared according to baseline moments. Economic growth plays a major role for a country: first, economic growth is the first necessary condition for overcoming poverty and backwardness; improving and improving people's quality of life (such as: increasing life expectancy, reducing malnutrition, reducing disease, developing education, culture , sports, etc.). Second, economic growth is a material condition for creating more jobs, reducing unemployment, and improving the standard of living for people. The determination of a reasonable rate of growth will therefore ensure that the economy is in a state of sustainable growth. For macroeconomic managers, the economic growth target at a relatively high rate and stability over a long period of time, associated with the protection of the ecological environment and social progress, remains a priority. In addition to reasonable internal economic policies, attention must be paid to policies relating to foreign affairs and currencies of each country in order to achieve a high and stable economic growth.

Theoretically, the impact of exchange rate deviations on growth has been widely noted in empirical studies but there is no consensus just yet. The majority of studies show a positive relationship between a more competitive currency (undervalued currency) and growth in emerging markets (Bleaney and Greenaway, 2001; Cottani, Cavallo and Khan, 1990; Dollar, 1992; Gala, 2007; Gala and Libanio, 2010; Ghura and Grennes, 1993; Gluzmann, Levy-Yeyati and Sturzenegger, 2012; Levy-Yeyati, Sturzenegger, and Gluzmann, 2013; Loayza, Fajnzylber, Calder Skott, 2012; Rodrik, 2008; Vaz and Baer, 2014). Some theoretical arguments are used to support this empirical relationship: extrovert policies expressed in the form of currency devaluation in East Asian countries that promote foreign trade and economic growth, while introvert policies are used in Latin America and Africa, linked to overvalued currencies that impede the growth of these currencies in the regions (Cottani, Cavallo and Khan, 1990; Dollar, 1992). Gala and Libanio (2010) argue that an undervalued currency is good for growth because it promotes industrial sector transactions in the economy of a country, which is primarily the activities that generate profit. In contrast, Ofair Razin and Susan M. Collins (1997) pointed out a non-linear relationship between exchange rates and the growth rate of an emerging country. Firstly, exchange rates can have an impact on domestic and foreign investment, accelerate the process of capital accumulation for the economy and thereby affect growth. Besides, exchange rates have an impact on foreign trade, increase the competitiveness of a country in the world and thus also help the economy grow. However, in the long run, maintaining a high exchange rate regime will increase import prices. In the context that inflation is being influenced by many factors and rising, this will create pressure on the monetary market and the commodity market, as well as psychological pressure as well as many other factors that inhibit economic growth. Therefore, evaluating the role of monetary valuation in promoting growth has many research implications.

Practically, on the momentum of economic development and increasingly deeper integration among countries in the world, considering the impact of exchange rates on the economy is extremely important since it creates an impact on domestic market prices, trade balance as well as national output. Therefore, the role of the exchange rate has become increasingly more

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evident, making its impact on economic growth a matter of great concern to many countries, including Vietnam and emerging countries in the ASEAN region.

## II. Methodology and Database

### a) Model

Based on the results of a review of previous studies, this study inherits and uses the research model by Habib, E. Mileva, L. Stracca (2017). The model managed to explain the relationship between the real effective exchange rate and economic growth, especially in low-income and middle-income countries (less than US$ 6,000/person/year). This process concerning the impact of the real effective exchange rate on economic growth rate is explained by Habib, E. Mileva, L. Stracca (2017) through the miraculous development of foreign trade in developing countries, through the model as follows:

$$GDP_{it} = \alpha + GDPC_{it-1} + REER_{it} + INF_{it} SAVE_{it} EI_{it} FDI_{it} + u_{it} \quad (1)$$

In which:

GDP it: GDP growth rate of country i in year t; $GDPC_{it-1}$: income per capita of country i in period (t-1); $REER_{it}$: real exchange rate of the country in period (t); $INF_{it}$: inflation rate of country i in period (t); $SAVE_{it}$: savings rate of country i in period (t); $EI_{it}$: trade openness of country i in period (t); $FDI_{it}$: inflow of foreign direct investment into country i in period (t). The panel data covering 5 countries was collected for 1989-2018.

*Real effective exchange rate*

The study uses a multilateral real effective exchange rate, which is used when considering many trading partners and is calculated on a weighted average basis. The formula is calculated as follows:

$$REER = \sum \beta_i \times Ei \times \frac{Pi^*}{P}$$

$$\beta_i = \frac{EX_i + IM_i}{EX + IM}$$

Pi*: is the general price index of country i, P is the domestic general price index; $\beta$is the share of trade with country i, EX và IM are the import and export values; E is the nominal rate

*Description of study variables*

*Panel 1:* Description of study variables

| Name of Variable | Unit | Description | Source |
|---|---|---|---|
| $GDP_{it}$ | % | $\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$ | World bank |
| $GDPC_{it-1}$ | % | $\frac{GDPC_{t-1} - GDPC_{t-2}}{GDPC_{t-2}}$ | World bank |
| $REER_{it}$ | % | $REER = \sum \beta_i \times Ei \times \frac{Pi^*}{P}$ | World bank |
| $INF_{it}$ | % | $\frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}$ | World bank |
| $SAVE_{it}$ | % | Gross national income minus total consumption, plus net transfers, calculated by %GDP | World bank |
| $EI_{it}$ | % | $\frac{Export\ goods\ value}{GDP_t} - \frac{Import\ goods\ value}{GDP_t}$ | World bank |
| $FDI_{it}$ | % | $\frac{FDI_t}{GDP_t}$ | World bank |

*Source: suggestions by the authors*

### b) Research hypotheses

*Income per capita of previous year (GDPC)*

According to Robert J. Barro (1991), people are considered as the key pioneers in the field of research, creating new and innovative products or ideas that help science grow. Therefore, in countries where people are focused, and income is improved, this is considered a premise to help the economy grow faster. This is also the principle used later on by researchers on economic growth, including Dani Rodrik (2008). According to him,



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the human factor or per capita income plays a unique role in most economic growth models. Katsushi S. Imai et al. (2012), Khan and Senhadji (2001),...who also used this in their research stated that GDP per capita achieved in the past is the financial basis for activities related to consumption, investment, government spending, import-export,…laying the foundation for the current economic growth.

The Balassa Samuelson model supposes that a nation's growth is mainly based on an increase in labor productivity in modern manufacturing. Meanwhile, labor productivity in traditional manufacturing and services sectors has little changes. Therefore, as labor productivity increases in modern manufacturing, wages in this sector also increase and this contributes to increased output of goods and services in the future. Thus, in developed countries with advanced science and technology, modern and traditional manufacturing and services are also developed, the manufacturing and service sectors are also enhanced in the following years. In other words, the living standards (per capita income) in these countries are even higher. Therefore, for this to make sense in the long run, Dani Rodrik (2008) per capita income (GDPC) is positively correlated with a country's economic growth rate. Some case studies that show a positive correlation between these two variables include: Dani Rodrik (2008); Robert J. Barro (1991); M.M. Habib, E. Mileva, L. Stracca (2017); Habib, E. Mileva, L. Stracca (2017).

*Hypothesis 1: Per capita income of previous year (GDPC) has a positive correlation with the economic growth rate of ASEAN countries.*

*Real Effective Exchange Rate (REER)*

Model (3) by Balassa Samuelson (1964) explained the fluctuations of real effective exchange rates in the long run. Balassa Samuelson argued that no purchasing power parity exists in the long term, or other words, the real effective exchange rate, in the long run, will change. The classical theory of purchasing power parity assumed that all goods are capable of trading among countries around the world. But in fact, goods in the economy are classified into 2 categories: exchangeable and non-exchangeable goods. When prices of exchangeable goods change, the nominal exchange rate also changes to conform to the theory of purchasing power parity. However, the nominal exchange rate can't reflect the price change of non-exchangeable goods; thus it also can't reflect the relative price change between the two commodity baskets in the two countries. The majority of studies show a positive relationship between a more competitive currency (undervalued currency) and economic growth (Dani Rodrik (2008); Gregory T. Papanikos (2015); Lee, Jaeseok, Yue, Chengyan (2017)). Some theoretical arguments are used to support this empirical relationship: extrovert policies expressed in the form of currency devaluation encourage foreign trade and promote economic growth, while introvert policies concerning overvalued currencies have hindered growth (Habib, E. Mileva, L. Stracca (2017); Bohl Martin (2015); Tang Bo (2014); Hadj Fraj, ( 2018); Arestis P, BaltarCT, (2018); Ribeiro, RSM, (2019).

In this formula, according to the Balassa Samuelson theory explained by Dani Rodrik, it is expected to carry a negative value, meaning that the exchange rate in richer countries tends to be more undervalued. However, in ASEAN countries, the author expects a positive value from the regression coefficient of this study variable, since these countries are still in the group of developing countries, the higher the exchange rate, the higher the rate of economic growth, which means that local currency is more undervalued.

*Hypothesis 2: The real effective exchange rate (REER) has a positive correlation with the economic growth rate of ASEAN countries.*

*Inflation rate (INF)*

Inflation can have a positive or negative impact on a country's economic growth. The positive impact of inflation on economic growth can be in two directions: First, inflation can positively impact economic growth through savings and investment channels. Sidrauski (1967) emphasized that reasonably low inflation will make investment more attractive than holding cash because holding cash reduces its value faster than investment. When an economy experiences inflation, there is always a gap between rising export prices and growing input costs, which is expressed in the gap in wage increases. Tobin (1972) considered moderate inflation as the lubricant of the economy (grease effect), inflation helps manufacturers to reduce real costs of buying labor inputs, thereby increasing savings and investment, encouraging them to expand production scale. Secondly, inflation is proportionally related to growth through demand stimulation effects. Inflation creates a psychological rise in price so people tend to consume more or buy stockpiles, thus increasing aggregate demand. In addition, inflation often leads to a devaluation of the local currency, enhances the competitiveness of the economy, and tends to increase net exports. Increased export demand stimulates demand for domestic goods and services - a source for export. In Keynes' aggregate demand theory, an economy is influenced by both aggregate supply and aggregate demand factors. However, the direct determinant of output and employment is aggregate demand. However, aggregate demand is often lower than aggregate supply due to the tendency to save in the use of income, which is the cause of the economic crisis. To ensure growth, there is the need of State intervention through policies such as expanding fiscal and monetary policies to improve aggregate demand, in which reducing interest rates will create inflation, thereby



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stimulating people to use cash for consumption and business investment (Sarel, 1996; Khan and Senhadji, 2001).

The negative impact of inflation on economic growth can be through two directions, including: Firstly, inflation creates changes in relative price and misallocation of resources. Fischer (1993) argued that inflation falsifies the distribution of resources due to changes that are unfavorable for correlated prices. When an economy experiences inflation, the different changes in goods price result in their relative price change, consumer decisions are distorted and the market loses its ability to effectively allocate resources. Second, inflation reduces investment - source activities, input of the economy. The uncertainty in the fluctuation of inflation is the main cause of long-term investment decline. Because investors cannot accurately calculate the real interest rate earned from investment activities, they do not dare to risk much investment, especially in long-term projects. Fischer (1993) developed a scheme to determine the "transmission channel" from macroeconomic policy implementation to growth as follows: rising inflation → declining investment → declining productivity growth rate → declining economic growth. According to Choi et al. (1996), Azariadas and Smith (1996), if inflation increases, it will reduce the actual interest rates that borrowers must pay to lenders, making it even negative. That situation leads to more people wanting to become borrowers instead of savers, thus creating an imbalance in capital and credit markets. Besides, high inflation also distorts taxes (Romer, 2001), reducing the savings motivation of depositors while saving is the source of investment. High inflation also causes "shoe leather cost," "menu cost," "confusion and inconvenience."

In this study, the author expects the inflation rate (INF) to have a positive or negative correlation with the economic growth rate.

*Hypothesis 3: The inflation rate (INF) has a positive/negative correlation with the economic growth rate of ASEAN countries.*

*Savings rate (SAVE)*

The ratio of the economy's capital savings to GDP is calculated by dividing (Gross national income minus total consumption, plus net transfers) by GDP. This is the basis for the total investment of a factor that Anderson, Dennis (1990), Muhammad S. Anwer, and R.K. Sampath (1999) used in the relevant research. As Sala-i-Martin (2002) mentioned, countries with high savings rates will have more capital investment and tend to grow faster than countries with less savings and investment. Investment has two important effects on the economy. In the short term, significant changes in investment affect aggregate demand, thereby affecting output and employment. In the long term, investment creates capital accumulation, scientific and technological development, potential output increase, and economic growth. In this study, the author expects the capital savings rate of the economy to be positively related to economic growth.

*Hypothesis 4: The capital savings rate of the economy (SAVE) has a positive correlation with the economic growth rate of ASEAN countries.*

*Trade Openness (EI)*

Trade openness is calculated by the difference between the proportion of exported goods and imported goods value to GDP. A positive indicator of the trade openness variable indicates that the country has a higher proportion of exports than imports and vice versa. This is the factor used in many previous research models such as Drukker et al. (2005), Pypko Sergii (2009),... Trade openness indicates the relationship between the ratio of exports and imports to the country's economic growth. when trade openness decreases, the value of imported goods increases, and the value of exported goods decreases, leading to a decrease in the output of national goods and services. Hans Singer (1950); Chee and Nair (2010); Sghaier and Albida (2013) suggest that in developing countries, income often depends on export revenue and investment depends on this source of income. Therefore, in this study, it is expected that the ratio of trade openness has the same dimensional relationship with economic growth.

*Hypothesis 5: Trade openness (EI) has a positive correlation with the economic growth rate of ASEAN countries.*

*Foreign Direct Investment (FDI)*

According to a foreign direct investment report published by UNCTAD (2014), countries in Asia and Southeast Asia are still attractive destinations of the world's FDI. FDI plays a significant role in improving the well-being of host countries thanks to the benefits associated with emerging technology, modern management strategies, skills growth, increased capital generating job opportunities and improving working conditions, as well as the creation of domestic industries receiving FDI (Haddad & Harrison, 1993; Markusen & Venables, 1999). A lot of empirical studies have shown over the past 20 years that the financial sector is an important part of economic growth. This suggests a well-functioning financial system is a prerequisite for a developed market economy (King and Levine, 1993; Levine, 2005). It is obvious from the aforementioned benefits that developing countries are keen to attract FDI and ASEAN countries are no exception. Recent studies analyze the impact of FDI on economic growth, some show that FDI can boost economic growth through spillover effects such as new technologies, capital formation, employment and development of human resources, expansion of international trade

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(Alguacil et al., 2002; Balasubramanyam et al., 1999; Basu et al., 2003; De Mello, 1997, 1999; Liu et al., 2004). Furthermore, financial development also helps FDI economies fully absorb the benefits of this inflow of capital (Patrick, 1966; Hermes & Lensink, 2003). Through this analysis, foreign direct investment (FDI) is assumed to have the same dimensional relation to economic development.

*Hypothesis 6: Foreign direct investment (FDI) has a positive correlation with the economic growth rate of ASEAN countries.*

In addition to describing how to calculate variables and data sources, the author also presented the expected impact and proposed basis in the following panel:

*Panel 2:* Description of expected impact and proposed basis

| Variable | Expected impact | Relevant studies |
|---|---|---|
| $GDPC_{it-1}$ | + | Dani Rodrik (2008); Robert J.Barro (1991); M.M. Habib, E. Mileva, L. Stracca (2017); Habib, E. Mileva, L. Stracca (2017). |
| $REER_{it}$ | + | Dani Rodrik (2008); Gregory T.Papanikos (2015); Lee, Jaeseok, Yue, Chengyan (2017); Habib, E. Mileva, L. Stracca (2017); Bohl Martin (2015); Tang Bo (2014); Hadj Fraj, (2018); Arestis P, BaltarCT, (2018); Ribeiro, R.S.M., (2019) |
| $INF_{it}$ | +/- | (+): Sidrauski (1967); Sarel (1996); Khan and Senhadji (2001)<br>(-): Choi et al. (1996), Azariadas and Smith (1996); Romer (2001); Fischer (1993) |
| $SAVE_{it}$ | + | Anderson, Dennis (1990), Muhammad S. Anwer andR.K. Sampath (1999); Salai Martin (2002) |
| $EI_{it}$ | + | Drukker et al. (2005), Pypko Sergii (2009), Hans Singer (1950); Chee và Nair (2010); Sghaier and Albida (2013) |
| $FDI_{it}$ | + | Haddad & Harrison (1993); Markusen & Venables (1999); King and Levine (1993); Levine (2005); Alguacil et al. (2002); Balasubramanyam et al. (1999); Basu et al. (2003); De Mello (1997), Liu et al. (2004) |

*Source: compiled by author*

### c) Methodology

The research model (1) is proposed by the author based on studies of the real effective exchange rate on the economic growth rate of countries around the world. Using Stata panel data software, the author uses panel data estimation methods such as Fixed Effects, Random Effects, Prais-Winsten to overcome heteroskedasticity and autocorrelation to construct a model that measures the impact of the effective multilateral exchange rate on development.

The author uses Prais-Winsten (PCSE) method to overcome this phenomenon when the model selected experiences autocorrelation or heteroskedasticity by entities.

## III. Empirical Results and Discussion

*Fixed Effects (FE) method*

*Panel 3:* Results of model 1 regression analysis using FE method

| | Estimation coefficient | Error | Test value | P value |
|---|---|---|---|---|
| REER | 20.38174 | 2.8039 | 7.27 | 0.000 |
| INF | -.1831392 | .0510807 | -3.59 | 0.000 |
| GDPC.L1 | .0545548 | .0778393 | 0.70 | 0.485 |
| SAVE | .0680284 | .0331824 | 2.05 | 0.042 |
| EI | -.1788705 | .0361326 | -4.95 | 0.000 |
| FDI | .1679446 | .0632435 | 2.66 | 0.009 |
| _cons | 3.689425 | 1.387426 | 2.66 | 0.009 |

The estimation results of the model (1) using the fixed effects method show the variables: the changes in multilateral real effective exchange rate (REER), trade openness rate (EI) and direct investment rate (FDI); inflation rate (INF) and the economy's savings rate (SAVE) have a statistically significant impact on economic growth, the coefficient of previous year's per capita income variable ($GDPC_{it}$-1) is not statistically significant to the economic growth rate in the sample.



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*RE - Random Effects method*

*Panel 4:* Results of model 1 regression analysis using RE method

| | Estimation coefficient | Error | Test value | P value |
|---|---|---|---|---|
| REER | 20.45402 | 2.946337 | 6.94 | 0.000 |
| INF | -.19198 | .0512425 | -3.75 | 0.000 |
| GDPC. L1 | .1674085 | .0768969 | 2.18 | 0.029 |
| SAVE | .0040277 | .0291532 | 0.14 | 0.890 |
| EI | -.0758081 | .0237986 | -3.19 | 0.001 |
| FDI | .1032661 | .0445314 | 2.32 | 0.020 |
| _CONS | 5.373469 | 1.198753 | 4.48 | 0.000 |

The estimation results of the model (1) using the random effects method show the variables related to previous year's income per capita ($GDPC_{it}$-1); changes in multilateral real effective exchange rate (REER); trade openness rate (EI); direct investment rate (FDI); inflation rate (INF) have a statistically significant impact on economic growth rate in the sample. The coefficient of the economic savings rate variables (SAVE) is not statistically significant to the economic growth rate.

*Autocorrelation test*

*Panel 5:* Autocorrelation test results

| $H_0$: | No first-Order autocorrelation test results |
|---|---|
| F(1, 4)= | 322.189 |
| Prob > F= | 0.0001 |

To evaluate autocorrelation, the authors conducted Wooldridge test. With the hypothesis:

$H_0$: There is no autocorrelation.
$H_1$: There is autocorrelation.

P-value = 0.0001 <significance level of 5%. Therefore we have the basis for rejecting the hypothesis $H_0$, meaning there is autocorrelation in the model at the significance level of 5%.

Thus, model (1) estimated using the fixed effects method has the phenomena of heteroskedasticity and autocorrelation. To overcome these two phenomena, the authors conducted a re-estimation of model (1) using the Prais-Winsten (PCSE) method.

*Prais-Winsten (PCSE) method*

*Panel 6:* Results of regression analysis using Prais-Winsten (PCSE) method

| | Estimation coefficient | Error | Test value | P value |
|---|---|---|---|---|
| REER | 16.20055 | 2.311049 | 7.01 | 0.000 |
| INF | -.1339275 | .0398918 | -3.36 | 0.001 |
| GDPC.L1. | .204305 | .0757989 | 2.70 | 0.007 |
| SAVE | .0131429 | .0232371 | 0.57 | 0.572 |
| EI | -.0651424 | .0216488 | -3.01 | 0.003 |
| FDI | .1234931 | .0461959 | 2.67 | 0.008 |
| _cons | 4.453595 | 1.000834 | 4.45 | 0.000 |

The estimation results of the model (1) using Prais-Winsten method show that previous year's per capita income variables (GDPCit-1); changes in multilateral real effective exchange rate (REER); direct investment rate (FDI) have a positive impact with a statistical significance level of 1% on the economic growth rate in the sample. The variables of the inflation rate (INF) and trade openness rate (EI) have a negative impact, with a statistical significance level of 1% on the economic growth rate. The coefficient of the economic savings rate variables (SAVE) is not statistically significant to the economic growth rate.

The estimation results show that changes in multilateral real effective exchange rate (REER) have a statistically significant 1% positive impact on the economic growth rate of 5 countries, which is consistent with the research hypothesis. The positive regression coefficient of 16.2 indicates that 1% devaluation of the local currency will have an impact on the economic growth at 16.2%. Thus, the author' research results are



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consistent with those by Dani Rodrik (2008); Gregory T. Papanikos (2015); Lee, Jaeseok, Yue, Chengyan (2017); Habib, E. Mileva, L. Stracca (2017); Bohl Martin (2015); Tang Bo (2014); Hadj Fraj, (2018); Arestis P, BaltarCT, (2018); Ribeiro, R.S.M., (2019), meaning that there is a positive relationship between the real effective exchange rate and the economic growth rate in developing countries, including Vietnam.

## IV. Conclusion

The estimation results of the model using the Prais-Winsten (PCSE) method show that 1% increase in the effective exchange rate will have a positive impact, increasing the economic growth rate of 5 countries by 16.2%. In addition, the previous year's per capita income (GDPCit-1); changes in multilateral real effective exchange rate (REER); direct investment rate (FDI) have a positive impact with a statistical significance level of 1% on the economic growth rate in the sample. Variables of inflation rate (INF) and trade openness rate (EI) have a negative impact with a statistical significance level of 1% on the economic growth rate. The coefficient of the economic savings rate variables (SAVE) is not statistically significant to the economic growth rate. Therefore, the study recommends that ASEAN countries need to orient the exchange rate according to the real exchange rate to evaluate, thereby determining the target exchange rate with a wider margin. And in the current period, to promote economic growth, Vietnam can consider the local currency devaluation mechanism at a moderate level, based on flexible exchange rate management according to the supply-demand relationship with state management to encourage exports and help the economy grow.

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