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## **THESIS SUMMARY**

**EXAMINATION OF THE DETERMINANTS OF EXCHANGE RATE:  
THE CASE OF VIETNAM**

*by*

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## **CHAPTER 1. INTRODUCTION**

The exchange rate regime in Vietnam is managed float (de jure-which is self-declared by the SBV) or stabilized arrangement (de facto-which is classified by the International Monetary Fund-IMF). However, in the context of ever-deeper economic integration, the use of efficient instruments to mitigate exchange rate risks may help firms not only minimize their financial losses but also differentiate themselves from their competitors (Berisha,2014).

Since the early 1970s, research in determinants of exchange rate has passed through various stages in its development. Several researchers take the position that three categories of explanatory variables, including national price levels, interest rates, and the balance of payments have traditionally been the focus of exchange rate determination models (Taušer, 2007). However, to the author's best knowledge, there exists few studies examining the effects of renewable energy on exchange rates and a study regarding Vietnam is missing. This study is aimed at filling this void in the literature.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1. An overview of the Vietnamese economy and its exchange rate system**

Vietnam has moved from a highly centralized planned economy to a mixed economy since the mid-1980s during the Doi Moi reform period. Prior to the collapse of the Soviet Union, North Vietnam and the reunified Vietnam were dependent on Communist assistance, whereas South Vietnam was dependent on US aid (Prybyla and Jan, 1996). In order to remedy the circumstance, a political and economic regeneration effort (Doi Moi) was launched in Vietnam in 1986, including measures meant to make it easier to move from a centrally planned economy to a type of market socialism known as a "Socialist-oriented market economy." Doi Moi promoted the formation of private companies engaged in the manufacturing of consumer products as well as foreign investment, especially foreign-owned businesses, by fusing economic planning with free-market incentives.

### **2.2. Exchange rate determination in Vietnam**

Generally, an exchange rate is the rate at which one currency will be exchanged for another currency (Frieden et al., 2019). In the same view as Frieden, Vogler et al. (2019) defined exchange rates as the price of one country's currency in relation to another. They can be represented as either the rate at the conclusion of the period or as the average rate over a certain amount of time.

Despite decades of research, it can be assumed that there is no ideal model that can reliably and exactly determine exchange rates (Nandrajog, 2019). Depending on the model's reliability and accuracy, different countries utilize different forecasting methods for exchange rates. However, much of the recent literature has not taken into account the direct and indirect impacts of renewable energy on the exchange rate in different countries. This research aims to fill this gap in the literature.

### 2.2.2. Exchange rate determinants in Vietnam

Although studies of exchange rate's determinants in Vietnam have been conducted by many authors, the impact of natural resources is still insufficiently explored. While a modest number of previous studies have looked into oil price (Le and Nguyen, 2011; Ngo et al., 2022), no prior studies have examined renewable energy as a variable that has an impact on exchange rate. We believe that this paper sheds new light on renewable energy as a determinant of exchange rate.

### 2.2.3. The roles of renewable energy

Generally, renewable energies can be defined as energy sources that regenerate themselves organically in the soil without running out (Owusu and Asumadu-Sarkodie, 2016). The author emphasized that renewable energy sources are innovative alternatives for generating power; they have tremendous promise since they could, in theory, provide all of the world's energy needs .

The lack of consistency in previous findings in other countries have motivated researchers to identify and evaluate this relationship in the context of Vietnam. In Vietnam, the demand for energy has far exceeded the domestic supply, which results in high electricity and fuel imported prices, as well as the environment pollution is at an alarming level. Therefore it is quite urgent for government to transition to renewable energy (Thuy et al., 2022)

## **2.3. Research objectives and research question**

### 2.3.1 Research objectives

After a thorough review of the available literature, this study observed that there has been little discussion on the relationship between exchange rate and the use of renewable energy. Also, the literature is observed covering limited time periods along with the traditional econometric approaches to explore the nexus between the said variables:

- From a theoretical perspective, this study aims to explain the impact of renewable energy on exchange rates in Vietnam.
- From a practical perspective, this study offers suggestions for policy makers and corporations in Vietnam to promote economic growth, profits and sustainable development.

### 2.3.2. Research Question

For the purpose of achieving the aforementioned research objectives, this study aims to look into the following research question:

*“What is the effect of renewable energy on the exchange rate in Vietnam?”*

Robust least squares (RLS) is applied to conduct regression analysis of exchange rate determination in Vietnam, with 8 variables taken into consideration: Nominal exchange rate, income, money supply, interest rate, inflation, total reserves, Brent oil price and Renewable energy. By adopting this model, the author would like to investigate the significance of variables, from which give an objective assessment of the influence of renewable energy on Vietnam’s exchange rate.

## CHAPTER 3: ESTIMATION METHODS

### 3.1. Model specification for nominal exchange rate determination

By combining Dornbusch's (1976) model, Frankel's (1979) interest rate differential model, Frenkel's (1976) flexible price model and Nghiem (2020)'s exchange rate model, this study applies exchange rate formula as follow:

$$e^t = \alpha_0 + \alpha_1 e_{t-1} + \alpha_2 y_t + \alpha_3 m_t + \alpha_4 f x_t + \alpha_5 \pi_t^e + \alpha_6 oil_t + \alpha_7 l_t + \alpha_8 RE_t$$

Where  $e_t$  denotes nominal exchange rate at time  $t$ ;  $y_t$ ,  $m_t$ ,  $f x_t$ ,  $\pi_t^e$ ,  $oil_t$ ,  $l_t$ ,  $RE_t$  stand for income, money supply, foreign exchange reserves, expected inflation, oil price, Lending interest rate and share of renewable energy in total final energy consumption at time  $t$  respectively;  $\varepsilon_t$  is the error term.

### 3.2. Data and variable description

This section provides the definitions, sources and measurement (construction) of variables used in the exchange rate model in Table ... (in subsection 3.2.1). Then in subsection 3.2.2, Tables ... shows the basic descriptive statistics of these variables. Next, Tables 4.5 illustrates their ADF and PP unit root tests results. Next, subsection 3.2.3 will provide the figures plotting the dependent variable (exchange rate in this chapter) against several independent variables. Finally, the computation of expected inflation is discussed in subsection 3.2.4

#### 3.2.1. Variable Definitions and Sources

Variables in the equation (3.1) are defined in the following Table 3.01

Variable	Name	Explanation	Source
$e$	Exchange rate	Log of Average interbank exchange rate measured as the number of VND per 1 USD (end of period)	IMF IFS

<b>Variable</b>	<b>Name</b>	<b>Explanation</b>	<b>Source</b>
<i>y</i>	Real income	Log of real GDP of Vietnam; Currency: USD	WB
<i>m</i>	Money supply	Log of money supply of Vietnam. Currency: USD (end of period)	IMF IFS
<i>fx</i>	Total reserves of Vietnam	Log of total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. Currency: USD	WB

<i><math>\pi</math></i>	Inflation rate	Prices, Consumer Price Index, All items, Percentage change, Corresponding period previous year of Vietnam; Percent	IMF IFS,
<i>oil</i>	Brent crude oil price	Log of Cushing, OK WTI Spot Price FOB (Dollars per Barrel)	EIA
<i>l</i>	Lending interest rate (%)	Lending interest rate of Vietnam (%)	WB
<i>RE</i>	RE consumption	Renewable energy consumption is the share of renewable energy in total final energy consumption (%)	WB

(end of table 3.01)



### 3.3. Empirical results and discussion of nominal exchange rate determination

#### 3.3.1. Unit Root Test Results

Table 3.02 presented the ADF and PP unit root tests results for variables with the significance level set at 5%. As can be seen in the table, the results show that all variables are non-stationary at levels but stationary at their first-difference forms, therefore they are I(1) at the 5% level. Therefore, in order to avoid spurious regression, all variables in equation (3.1) will enter the model in their first-difference forms.

#### 3.3.2. Regression Results

##### 3.3.2.1. Table results

**Table 3.03. Correlation coefficient values for Nominal Exchange Rate Model (Annually Frequency)**

*This table presents empirical analysis of variables used in equation (3.1) at annually frequency; it presents the correlation coefficient values between the exchange rate (e) and dependent variable. Rn2 is the test of joint-significance of all variables in the model.*

Method: Robust Least Squares								
	<i>e</i>	<i>y</i>	<i>m</i>	<i>fx</i>	$\pi$	<i>oil</i>	<i>l</i>	<i>RE</i>
coefficient	0.0003	0.3704	0.0418	-0.0592	-0.0019	0.0053	-0.0025	0.0014
(p-value)	0.9265	0.0000	0.0000	0.0000	0.5527	0.0000	0.0000	0.0000
	<i>Rn2</i>	0.625893			Adjusted <i>Rn2</i>		0.462222	

Source: Author's calculations

(end of table 3.03)

##### 3.3.2.2. Discussion of results

Results of the determinants of nominal exchange rate are presented in Tables 3.03. As can be seen from the table, renewable energy is highly significant suggesting that the use of renewable energy has a positive impact on Vietnam's exchange rate. The impact of Vietnam's income is still unclear, as this variable is insignificant at 1% level.

The third variable is the money supply. This variable has a positive sign – which support the hypotheses, indicating that one percent rise in money supply will lead to a 4.18%

depreciation of Vietnam dong. Next, the variable total reserves is negative and significant at the 1% level, implying that when the total reserves of Vietnam increases by one percent, the exchange rate is expected to appreciate by 5.92%, with other variables constant. According to the results of this study, inflation rate is highly significant at the 1% level, which implies that it has a great influence on Vietnam's exchange rate.

The next variable is Brent crude oil price. It should be noted that the result might differ between oil exporters and oil importers. The results show that it has a significant impact on exchange rate. The coefficient is 0.0053, suggests that when the oil price increases by one percentage, the exchange rate will depreciates by 0.53% as a result

Finally, the empirical finding suggests that lending interest rate has a significant relationship with Vietnam exchange rate at 1% level. The (-) sign implies that it have a negative impact on Vietnam's currency, while the coefficient of - 0.0025 suggests that, with every 1% increase in lending interest rate may lead to a 0.25% appreciation in Vietnamese dong.

## **CHAPTER 4: DISCUSSION**

### 4.1. Result discussion and implications

This study examines the potential determinants of Vietnam's nominal exchange rates using data at annual frequencies, with the emphasis on renewable energy. These determinants include Income, Money supply, Total reserves, Inflation rate, Brent crude oil price and Interest rate, and Renewable energy consumption. From the results analyzed in the previous section, there are some findings to summarize and discuss. The major finding of this study is the confirmation about relationship between the consumption of renewable energy and Vietnam's exchange rate. It is interesting to find that an increase in renewable energy consumption leads to the depreciation of Vietnamese dong.

### 4.2. Contributions of the research

#### 4.2.1. Theoretical contribution

According to the findings of this research, Renewable energy consumption are possibly have a positive impact on exchange rate, which means causing Vietnam exchange rate to depreciation. To the author's best knowledge, this is the first study of exchange rate determination in Vietnam that takes the role of renewable energy explicitly into account.

#### 4.2.2. Practical contribution

The significant impact of renewable energy on exchange rate implies that higher renewable energy consumption can cause the Vietnam Dong to depreciate, which in turn, may boost exports and therefore GDP growth. Therefore, the production and consumption of renewable energy should be further encouraged by governments. Governments should take some measures, such as tax breaks and subsidies for solar energy installation, Performance-based incentives and make public investments to encourage the use of renewable energy.

#### 4.2.3. Limitations and future research direction

The model is short-run only in nature. Second, this paper only uses annual data. In future studies, researchers may employ higher frequency data such as quarterly or monthly to investigate the impact of renewable energy on exchange rate in greater details (when these data especially renewable energy are available at greater frequency).

## **CHAPTER 5: CONCLUSION**

By approaching Robust Least Squares, the results clearly demonstrate that factors such as Money supply, Oil price and Renewable energy consumption tend to have negative impact on the value of Vietnamese dong. On the other hand, the total reserves, inflation rate and lending interest rate show a positive relationship, as their growth may result in the appreciation of Vietnam exchange rate.

In addition, the relationship between renewable energy consumption and exchange rate in Vietnam is confirmed. The results turn out that renewable energy consumption have negative impact on Vietnam exchange rate. As the renewable energy percentage increases, the value of Vietnamese dong decreases, which stimulates export and demand for domestic goods.