**MINISTRY OF EDUCATION AND TRAINING  
UNIVERSITY OF ECONOMICS HO CHI MINH CITY**

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**THE IMPACT OF MACRO-ENVIRONMENT TO EXCHANGE RATE PASS-THROUGH**

**IN VIETNAM**

Major: Finance – Banking

Code: 9340201

**SUMMARY OF PH.D THESIS**

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# **Chapter 1: INTRODUCTION**

## **1.1 Research background**

The year 2000 is a milestone marking 15 years of Vietnam's Doi Moi policy. In the period 2000 - 2018, the world and the Vietnamese economy experienced two major crises, such as the subprime debt crisis (2008) from US and the public debt crisis (2010) from European countries. After these two crises, many countries' monetary and fiscal policies have changed drastically, many economic stimulus packages have poured into the economy to help recover and stabilize the economy. An inevitable result of this intervention is that the currencies of countries around the world are more volatility and the Vietnam Dong is affected. In the period 2000 - 2018, the State Bank implemented a more flexible exchange rate policy.

Vietnam's inflation during this period was under pressure from the world economy and domestic pressure. Many interventions to stabilize exchange rates, stabilize prices and macroeconomics have been implemented by the Government and the State Bank of Vietnam during this period. Changes in exchange rates are an important input factor affecting the macroeconomic situation especially the level of inflation in the economy. The period 2000 - 2018 with many ups and downs showed the close relationship between inflation and exchange rates in Vietnam, this relationship is called by economists as exchange rate transmission.

Exchange rate pass-through (ERPT) is the percentage change in domestic prices (import, manufacturing, and consumer prices) in local currencies when the nominal exchange rate changes 1%. If the price reacts in a 1:1 ratio is called complete pass-through, if the transmission level is less than 1 is called partial pass-through.

## **1.2 Reasearch gaps**

The exchange rate pass-through issue in Vietnam has received much research interest from academia in recent years. There are some studies such as Nguyen Thi Ngoc Trang and Luc Van Cuong (2012), Tran Van Hung (2015), Tran Ngoc Tho, and Nguyen Thi Ngoc Trang (2015), and Pham Thi Thanh Xuan et al. (2017). They have considered the nonlinear relationship of exchange rate pass-through, for example, the exchange of exchange rate into inflation will be different depending on the level of inflation and the economic cycle.

However, the literature on exchange rate pass-through shows that the level of exchange rate transfers is also influenced by a number of other factors in the macro-environment such as fluctuations and volatility in exchange rates, and the trade openness

Among the studies on the nonlinear relationship of exchange rates pass-through in Vietnam, only the environment of inflation and the economic cycle was mentioned. However, there are still some non-linear aspects of the exchange rate that have not yet been implemented in the Vietnamese economy such as the impact of exchange rate instability, and trade openness. This is the gap that this thesis wants to fill.

The thesis uses a smooth transition regression model to describe the process of changing the level of gradual transmission of the economy when macro factors pass a certain threshold level because of the reaction of the heterogeneity of enterprises. Because the economy has a certain delay, the transmission process cannot move as abruptly as the regression models. This model is also different from published works in search of evidence on nonlinear transmission of exchange rates in Vietnam.

## **1.3 Research objects**

This thesis is conducted towards the following objectives:

Firstly, to investigate the effect of factors of macro-environmental factors on the process of transferring the exchange rate into inflation in Vietnam. The author will estimate the difference in the shifts of exchange rate into inflation in relation to different macrostates of Vietnam economy such as high and low inflation environment, high and low fluctuation or volatility of exchange rate, expand and slowdown economy and high and low trade openness.

Secondly, to find the empirical evidence on the nonlinear relationship of exchange rate pass-through into inflation under various macro conditions by applying the smooth transition regression model.

Thirdly, to make recommendations to help policy-making agencies have information to formulate policies to regulate exchange rates and stabilize prices in line with each specific economic context in the Vietnamese economy.

## **1.4 Contribution of the thesis**

First of all, the smooth transition regressive (STR) model is applied in this thesis allows smooth transitions between regimes or states of the economy. This model is suitable to describe the heterogeneous response of firms in the economy makes the exchange rate pass-through on the price level more slowly. This is a crucial methodological difference from the published paper of other authors in this field in Vietnam.

Secondly, the study uses some potential transitions to proxy different states of the economy, such as high or low inflation, level of exchange rate rates, exchange rate volatility, trade openness, and economic expansion or contraction to study the response of inflation to exchange rate shocks in each of these contexts. Results from the study show the influence of the macro-environment on the level of exchange rate pass-through on inflation in Vietnam. The study also confirms the existence of the nonlinear relationship between the exchange rate pass-through to inflation in Vietnam under different macroeconomic states of the economy. Accordingly, the level of pass-through will change as the economy moves from one state to another.

Thirdly, the empirical results from the thesis show that exchange rate pass-through is positive for the inflation level of the Vietnamese economy in the short and long term. Specifically, when the inflation rate is greater than the threshold of 1,195% / month, the transmission rate will increase significantly.

Fourthly, the results from the study show an inverse relationship in the short and long run between the changes in the exchange rate and the exchange rate pass-through. When the exchange rate surpassed the threshold of 0.094% / month, the pass-through decreased again. This suggests that there is no evidence of the 'menu cost' issue but that there is evidence of the 'market share problem' during the research period in Vietnam. Results from the study show that firms will adjust prices in response to sub-threshold changes in exchange rates ignoring the issue of menu costs. However, the pressure of holding market share will cause businesses to limit price adjustments when the exchange rate fluctuates beyond the threshold.

Fifthly, the results show that firms will transmit more exchange rate changes to prices when they perceive that exchange rate risk (measured by the daily exchange rate standard deviation) in the market increases. When the exchange rate risk is low, businesses will suffer to maintain market share, but when the exchange rate volatility increases, the enterprise will act to reflect these fluctuations in the price, making the pass-through increase.

Sixthly, the results show that the level of pass-through is negative with the short-term economic cycle but positive with the long-term economic cycle. In the short-term, when the economy booms, it will reduce the transmission rate, but in the long-term when the economy is expansion, the transmission rate will increase, so the government should take this into account in the process of operating the economy.

Last but not least, the trade openness shows that the market opening is low, the pass-through will be higher than when the economy is more open in the short and long term. This shows that the competitive pressure between enterprises when the economy is more open contributes to reducing the pass-through of exchange rates into prices. Thus, the policy of opening up the economy to welcome foreign enterprises to do business in Vietnam can bring about a more competitive environment, thereby helping to neutralize the movement in exchange rates to the levels price.

# **Chapter 2: LITERATURE**

Among the studies on the exchange rates pass-through, many studies have emphasized the influence of macro-environmental factors on the level of transmission. For example, Ghosh (2013) emphasized that the role of a country's macroeconomic foundation should be considered when analyzing the relationship ERPT. In the same way, Taylor (2000) has shown that a country with stable monetary policy and lower inflation rates will have lower transmission levels. Furthermore, fluctuations in exchange rates and exchange rate instability can also affect the level of exchange rate transmission mentioned in the studies of Devereux and Engel (2001), Froot and Klemper (1989), and Meurers (2003). In addition, another macro factor can affect the ERPT is trade openness such as in the studies of McKinnon (1963), Romer (1993), Menon (1995), and McCarthy (2007).

## **2.1****The relationship between inflation environment and ERPT**

The different inflationary stage influence the pricing behavior of businesses. Taylor (2000) uses a staggered pricing model to show that changes in the firm's valuation power come from changes in firm expectations about the persistence of changes in prices and costs of other businesses in the market. This means one firm will determine the price increase depending on the expectation of a persistent increase in costs and prices in other businesses.

Baharumshah et al. (2017) on the one hand agrees with Taylor (2000) and adds the role of inflation instability. The authors argue that businesses will not forward changes in exchange rates into prices if inflation instability is low. Because high volatility in inflation represents the instability and unpredictability of inflation in the economy, implying increased risks in the economy. As a result, this makes businesses tend to increase the level of the exchange rate into the price to limit risks on their side and vice versa. Therefore, the instability in inflation can also be considered as a source of nonlinear relationships in exchange rate transmission.

Baqueiro et al. (2003) found evidence that ERPT during periods of high inflation was higher than low inflation periods. This evidence suggests that the relationship between the level of exchange rate exchange on domestic prices and the inflationary environment is nonlinear.

Gagnon and Ihrig (2004) have developed a theoretical model to measure the influence of central banks' inflation stabilization policy on the level of exchange rate transmission. Results from this study show that countries with low and stable inflation levels imply that the central bank's inflation stabilization policy is effective, and the level of transmission from the exchange rate to inflation becomes low.

Choudhri and Hakura (2006) show a positive and significant relationship between the level of transmission and the average inflation of countries in the sample.

Ca’Zorzi et al. (2007) also show reliable evidence of the positive relationship between the exchange rate and inflation.

Nogueira and León-Ledesma (2011) use a smooth transition regression model to measure the transmission of exchange rate into inflation in a nonlinear manner, the results show that ERPT depends on the level of inflation. Consequently, the level of transmission will be higher when inflation exceeds a threshold level and vice versa.

## **2.2 The relationship between exchange rate volatility and ERPT**

Previous studies on the effects of exchange rate fluctuations on exchange rate transmission show that prices in the economy are asymmetric in response to trends and size changes in exchange rates. A number of theoretical models have been used to explain the asymmetric response of prices to exchange rate fluctuations, such as maintain market share, production shift effects, limit supply capacity, and menu costs.

Knetter (1994) shows that in the context of exchange rate fluctuations, the price-setting behavior of enterprises will be affected in different directions due to conditions of supply limit, trade barriers makes the level of transition changes in the exchange rate into the selling price will change.

Gil-Pareja (2000) finds evidence of asymmetry in the practice of setting prices to trade by firms at a time when exporters’ currencies are rising and falling. In addition, Pollard and Coughlin (2004) show that enterprises also react asymmetrically to big or small changes in exchange rates. Furthermore, Bussière (2013), Faryna (2016) also show that exchange rate transmission is nonlinear and asymmetric. However, Cheikh (2012) shows no clear evidence of asymmetric trends of ERPT in the sample countries.

## **2.3 The relationship between economic cycle and ERPT**

During the booming period, the level of exchange rate transmission is expected to be higher than during the economic recession. The reason is that companies find it easier to shift changes in exchange rates into their selling prices during times of economic growth than when the economy is stagnant and their sales are declining.

Goldfajn and Werlang (2000) show that the recession leads to higher price transmission than the expansion period. Meanwhile, Correa and Minella (2006), Przystupa and Wróbel (2011) through the thresholds of Phillips curve also confirm the asymmetric behavior of ERPT with economic growth.

Nogueira and León-Ledesma (2008) show evidence of a nonlinear relationship between ERPT and yield disparities in several countries in their sample.

## **2.****4 The relationship between trade openness and ERPT**

Most of the studies on this topic expect a positive relationship between ERPT and trade openness. The higher the trade openness is, the higher the price response to changes in the exchange rate (McKinnon (1963), McCarthy (2007)).

However, Romer (1993) provides empirical evidence that inflation is inversely related to openness, whereby the average rate of inflation is smaller in countries with greater openness. According to Taylor's (2000) hypothesis, inflation and transmission are positively correlated, so it is possible to make a statement that the trade openness and exchange rate transmission coefficient are negatively correlated.

Menon (1995) concluded that the level of transmission is different due to the influence of the size and openness of each economy.

McCarthy (2000) and Bitāns (2005) the level of transmission has a positive relationship with the openness of the country.

Barhoumi (2005) shows that the degree of national opening, when measured by tariff barriers, has an effect on ERPT, the lower level of barriers means that the greater the openness, the greater the long-term ERPT transmission.

Research by Ca’Zorzi et al. (2007) also suggests that the more open the country is to trade, the more changes in exchange rates are more closely communicated into the consumer price index through import prices.

Ghosh (2013) also finds evidence that countries pursuing larger trade opening policies have a positive effect on ERPT.

Sek and Kapsalyamova (2008) find a weak link between trade openness and exchange rate transmission in four Asian countries.

## **2.5 Some typical ERPT studies in Vietnam**

Nguyen Thi Ngoc Trang and Luc Van Cuong (2012) showed that the transmission of exchange rate into the import price is complete but found no evidence of asymmetric transmission of the scale of exchange rate fluctuations into import price.

Tran Van Hung (2015) used the VAR model to provide evidence confirming the Taylor (2000) hypothesis that exchange rate pass-through depends on the inflationary environment.

Tran Ngoc Tho and Nguyen Thi Ngoc Trang (2015) using the TVAR model show that exchange rate pass-through depends on the inflationary environment, the level of transmission increases when the economy is in high inflation state about 0.333%/month.

Pham Thi Thanh Xuan et al. (2017) used the space state model to show that the mechanism of the exchange rate to inflation is dynamic, changes over time, and depends on the macroeconomic environment in the country and the world.

# **Chapter 3: METHODOLOGY AND DATA**

## **3.1. Methodology**

Quantitative analysis is applied in this thesis to investigate the nonlinear relationship between the level of exchange rate pass-through and macro-environmental factors in Vietnam.

The smooth transition regression (STR) model is used to study the relationship between exchange rate transmission and different macrostates of the economy. This approach is similar to the method used in the study of exchange rate pass-through by Herzberg et al. (2003), Nogueira and León-Ledesma (2008), Cheikh (2012) and Shintani et al. (2013).

To estimate the relationship between exchange rate transmission and inflation in Vietnam under different macro conditions, the thesis uses a number of potential transitional variables such as inflation, level changes, and deviation standard of nominal exchange rate (USD/VND), industrial output gap and trade openness.

## **3.2 Empirical model**

Empirical model use monthly frequency data.

**(3.26)**

Empirical model use quarterly frequency data:

**(3.27)**

Where:

* **inf:** inflation is calculated as a percentage change of the consumer price index
* **:** percentage change of the index of industrial production
* **opg:** output gap
* **gpi:** percentage change of the import price index
* **imp:** percentage change of the consumer price index
* **er:** percentage change of nominal exchange rate USDVND
* **:** transition function
* **:** the slope parameter indicating the transition rate between two regions of the transition function
* **:** threshold
* **s:** transition variable
* error term

Short run ERPT coefficient:

* SR ERPT =

Long run ERPT coefficient

* LR ERPT =

is assumed as logics function (LSTR) or exponential function (ESTR).

## **3.3 Data**

The study used monthly frequency data from January 2000 to December 2018. However, to investigate the research question about the level of exchange rate pass-through depends on the trade openness the quarterly frequency data is applied. The data source was collected from Data Stream of Thomson Reuters and the General Statistics Office of Vietnam.

# **Chapter 4:** **SUMMARY OF RESULTS**

## **4.1 Inflation as a transition variable**

**Table 4.9:** **Result with inflation as a transition variable**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Coefficient** | | | | **Std. Error** | | **t-Statistic** | **Prob.** | |
| **Threshold Variables (linear part) G = 0** | | | | | | | | |
| c | 0,145 | | | | 0,042 | | 3,481 | 0,001 | |
| er | 0,010 | | | | 0,054 | | 0,183 | 0,855 | |
| er (-1) | -0,065 | | | | 0,054 | | -1,198 | 0,233 | |
| er (-2) | -0,060 | | | | 0,050 | | -1,201 | 0,231 | |
| **Threshold Variables (nonlinear part) G = 1** | | | | | | | | |
| c | -0,248 | | | | 0,135 | | -1,842 | 0,067 | |
| er | 0,090 | | | | 0,076 | | 1,185 | 0,238 | |
| er (-1) | 0,317 | | | | 0,075 | | 4,240 | 0,000 | |
| er (-2) | 0,041 | | | | 0,077 | | 0,540 | 0,590 | |
| **Non-Threshold Variables** | | | | | | | | |
| inf\_sa (-1) | 0,622 | | | | 0,071 | | 8,748 | 0,000 | |
| inf\_sa (-2) | 0,140 | | | | 0,067 | | 2,097 | 0,037 | |
| iip\_sa | -0,007 | | | | 0,009 | | -0,816 | 0,415 | |
| iip\_sa (-1) | 0,017 | | | | 0,009 | | 1,921 | 0,056 | |
| iip\_sa (-2) | 0,000 | | | | 0,009 | | -0,033 | 0,974 | |
| iip\_sa (-3) | -0,020 | | | | 0,009 | | -2,308 | 0,022 | |
| iip\_sa (-4) | 0,003 | | | | 0,009 | | 0,348 | 0,728 | |
| iip\_sa (-5) | -0,003 | | | | 0,009 | | -0,371 | 0,711 | |
| iip\_sa (-6) | -0,002 | | | | 0,009 | | -0,244 | 0,808 | |
| iip\_sa (-7) | -0,003 | | | | 0,009 | | -0,338 | 0,736 | |
| iip\_sa (-8) | -0,022 | | | | 0,008 | | -2,668 | 0,008 | |
| iip\_sa (-9) | 0,013 | | | | 0,008 | | 1,577 | 0,116 | |
| gpi | 0,027 | | | | 0,007 | | 3,769 | 0,000 | |
| gpi (-1) | 0,014 | | | | 0,008 | | 1,860 | 0,064 | |
| **Slopes** | | | | | | | | |
| Slope | | 31,453 | | | 85,371 | | 0,368 | 0,713 | |
| **Thresholds** | | | | | | | | |
| Threshold | 1,195 | | | | 0,091 | | 13,095 | 0,000 | |
| R-squared | | | | 0,727 | | Mean dependent var | | 0,554 | |
| Adjusted R2 | | | | 0,694 | | S.D. dependent var | | 0,656 | |
| S.E. of regression | | | | 0,363 | | Akaike info criterion | | 0,914 | |
| Sum squared resid | | | | 25,549 | | Schwarz criterion | | 1,287 | |
| Log likelihood | | | | -75,645 | | Hannan-Quinn criter. | | 1,065 | |
| F-statistic | | | | 22,421 | | Durbin-Watson stat | | 2,025 | |
| Prob(F-statistic) | | | | 0,000 | |  |  |  | |
|  | | | **G = 0** | | | | **G = 1** | |
| SR ERPT | | | 0,010 | | | | 0,100 | |
| *p\_value* | | | *0,855* | | | | *0,044* | |
| LR ERPT | | | -0,483 | | | | 1,396 | |
| *p\_value* | | | *0,193* | | | | *0,032* | |

Results from the study show that exchange rate pass-through has a positive relationship with the inflationary stages in Vietnam. Specifically, when the inflation rate in the economy exceeds the threshold of 1.195% / month, the pass-through increases to 0.1 in the short-term and 1.39 in the long-term.

In the short-term, the ERPT is positive with the inflation rate but with small value that come from the inflation stabilization policies that the Government has pursued during the past time.

Long-term results in Vietnam provide evidence consistent with Taylor's (2000) hypothesis of a positive relationship between exchange rate pass-through and the inflationary environment. This shows that when inflation level is below the threshold, importers in Vietnam will absorb changes in exchange rates leading to low pass-through. However, in a high inflation environment they will translate changes in exchange rates into selling prices, which causes pass-through to increase over time.

## **4.2 Exchange rate as a transition variable**

The results show that evidence of a change in the exchange rate has an inverse relationship with exchange rate pass-through. In the short-term, when the exchange rate fluctuates low and is above the threshold of 0.094% / month, the ERPT pass-through is 0.115 and falls to -0,291. In the long term, the results show that when the exchange rate fluctuates below and above the threshold, the cumulative pass-through is 1.079 versus -0.994, respectively.

**Table 4.13: Result with exchange rate as a transition variable**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Coefficient** | | | | **Std. Error** | | **t-Statistic** | **Prob.** | |
| **Threshold Variables (linear part) G = 0** | | | | | | | | |
| c | 0,068 | | | | 0,050 | | 1,370 | 0,172 | |
| er | 0,115 | | | | 0,041 | | 2,775 | 0,006 | |
| er (-1) | 0,225 | | | | 0,042 | | 5,343 | 0,000 | |
| er (-2) | -0,034 | | | | 0,044 | | -0,757 | 0,450 | |
| **Threshold Variables (nonlinear part) G = 1** | | | | | | | | |
| c | 0,123 | | | | 0,059 | | 2,079 | 0,039 | |
| er | -0,197 | | | | 0,072 | | -2,734 | 0,007 | |
| er (-1) | -0,344 | | | | 0,077 | | -4,470 | 0,000 | |
| er (-2) | -0,047 | | | | 0,070 | | -0,673 | 0,502 | |
| **Non-Threshold Variables** | | | | | | | | |
| inf\_sa (-1) | 0,625 | | | | 0,065 | | 9,576 | 0,000 | |
| inf\_sa (-2) | 0,091 | | | | 0,061 | | 1,488 | 0,138 | |
| iip\_sa | -0,003 | | | | 0,008 | | -0,402 | 0,688 | |
| iip\_sa (-1) | 0,015 | | | | 0,008 | | 1,742 | 0,083 | |
| iip\_sa (-2) | 0,004 | | | | 0,009 | | 0,508 | 0,612 | |
| iip\_sa (-3) | -0,018 | | | | 0,008 | | -2,105 | 0,037 | |
| iip\_sa (-4) | 0,007 | | | | 0,009 | | 0,767 | 0,444 | |
| iip\_sa (-5) | -0,008 | | | | 0,008 | | -0,958 | 0,340 | |
| iip\_sa (-6) | -0,003 | | | | 0,008 | | -0,320 | 0,749 | |
| iip\_sa (-7) | -0,001 | | | | 0,008 | | -0,086 | 0,932 | |
| iip\_sa (-8) | -0,025 | | | | 0,008 | | -3,021 | 0,003 | |
| iip\_sa (-9) | 0,014 | | | | 0,008 | | 1,676 | 0,095 | |
| gpi | 0,030 | | | | 0,007 | | 4,333 | 0,000 | |
| gpi (-1) | 0,021 | | | | 0,007 | | 2,901 | 0,004 | |
| **Slopes** | | | | | | | | |
| Slope | | 267,439 | | | 591,362 | | 0,452 | 0,652 | |
| **Thresholds** | | | | | | | | |
| Threshold | 0,094 | | | | 0,010 | | 9,328 | 0,000 | |
| R-squared | | | | 0,741 | | Mean dependent var | | 0,554 | |
| Adjusted R2 | | | | 0,710 | | S.D. dependent var | | 0,656 | |
| S.E. of regression | | | | 0,353 | | Akaike info criterion | | 0,861 | |
| Sum squared resid | | | | 24,225 | | Schwarz criterion | | 1,234 | |
| Log likelihood | | | | -69,841 | | Hannan-Quinn criter. | | 1,011 | |
| F-statistic | | | | 24,109 | | Durbin-Watson stat | | 2,035 | |
| Prob(F-statistic) | | | | 0,000 | |  |  |  | |
|  | | | **G = 0** | | | | **G = 1** | |
| SR ERPT | | | 0,115 | | | | -0,291 | |
| *p\_value* | | | *0,006* | | | | *0,009* | |
| LR ERPT | | | 1,079 | | | | -0,994 | |
| *p\_value* | | | *0,000* | | | | *0,000* | |

The opposite results in the short-term illustrate that the problem of “menu cost” does not seem to exist in Vietnam, because firms are willing to convert changes in exchange rates into prices even if the change is below the threshold. However, when the exchange rate fluctuations exceed the threshold, the rate of exchange rate transmission decreases, which shows that in Vietnam there may exist the problem of “maintaining market share” affecting the pricing behavior of enterprises. This study result is similar to the empirical evidence found by Gil-Pareja (2000), Olivei (2002), Pollard and Coughlin (2004), Bussière (2013), Nogueira and León-Ledesma (2008), Cheikh (2012).

## **4.3 Volatility of exchange rate as transition variable**

The results from the thesis show a significant positive relationship between the level of volatility in the exchange rate (calculated by the standard deviation of the nominal daily rate) and the level of exchange rate pass-through. In the short-term, when the volatility of the exchange rate below the threshold the pass-through level reaches -0,109 while it surpasses the threshold the pass-through will rise to 0.168. Similar results also find that in the long-run, the exchange rate pass-through increases when the exchange rate volatility exceeds the threshold, but this result is not enough statistical evidence.

**Table 4.16: Results with exchange rate volatility as transition variable**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Coefficient** | | | | **Std. Error** | | **t-Statistic** | **Prob.** | |
| **Threshold Variables (linear part) G = 0** | | | | | | | | |
| c | 0,120 | | | | 0,039 | | 3,041 | 0,003 | |
| er | -0,109 | | | | 0,054 | | -2,025 | 0,044 | |
| er (-1) | 0,143 | | | | 0,039 | | 3,664 | 0,000 | |
| er (-2) | -0.112 | | | | 0,041 | | -2,766 | 0,006 | |
| **Threshold Variables (nonlinear part) G = 1** | | | | | | | | |
| c | 0,062 | | | | 0,104 | | 0,594 | 0,553 | |
| er | 0,277 | | | | 0,121 | | 2,294 | 0,023 | |
| er (-1) | -0,195 | | | | 0,175 | | -1,115 | 0,266 | |
| er (-2) | 0,183 | | | | 0,191 | | 0,958 | 0,339 | |
| **Non-Threshold Variables** | | | | | | | | |
| inf\_sa (-1) | 0,640 | | | | 0,064 | | 10,008 | 0,000 | |
| inf\_sa (-2) | 0,108 | | | | 0,059 | | 1,817 | 0,071 | |
| iip\_sa | -0,007 | | | | 0,008 | | -0,818 | 0,414 | |
| iip\_sa (-1) | 0,015 | | | | 0,008 | | 1,772 | 0,078 | |
| iip\_sa (-2) | -0,001 | | | | 0,008 | | -0,150 | 0,881 | |
| iip\_sa (-3) | -0,017 | | | | 0,008 | | -1,998 | 0,047 | |
| iip\_sa (-4) | 0,000 | | | | 0,008 | | 0,028 | 0,978 | |
| iip\_sa (-5) | -0,004 | | | | 0,008 | | -0,476 | 0,635 | |
| iip\_sa (-6) | -0,002 | | | | 0,008 | | -0,273 | 0,785 | |
| iip\_sa (-7) | -0,004 | | | | 0,008 | | -0,503 | 0,615 | |
| iip\_sa (-8) | -0,023 | | | | 0,008 | | -2,842 | 0,005 | |
| iip\_sa (-9) | 0,013 | | | | 0,008 | | 1,640 | 0,103 | |
| gpi | 0,024 | | | | 0,007 | | 3,529 | 0,001 | |
| gpi (-1) | 0,021 | | | | 0,007 | | 3,047 | 0,003 | |
| **Slopes** | | | | | | | | |
| Slope | | 2,927 | | | 4,486 | | 0,653 | 0,515 | |
| **Thresholds** | | | | | | | | |
| Threshold | 4,219 | | | | 0,567 | | 7,443 | 0,000 | |
| R-squared | | | | 0,723 | | Mean dependent var | | 0,554 | |
| Adjusted R2 | | | | 0,690 | | S.D. dependent var | | 0,656 | |
| S.E. of regression | | | | 0,365 | | Akaike info criterion | | 0,927 | |
| Sum squared resid | | | | 25,892 | | Schwarz criterion | | 1,300 | |
| Log likelihood | | | | -77,096 | | Hannan-Quinn criter. | | 1,078 | |
| F-statistic | | | | 22,013 | | Durbin-Watson stat | | 2,087 | |
| Prob(F-statistic) | | | | 0,000 | |  |  |  | |
|  | | | **G = 0** | | | | **G = 1** | |
| SR ERPT | | | -0,109 | | | | 0,168 | |
| *p\_value* | | | 0,044 | | | | 0,093 | |
| LR ERPT | | | -0,311 | | | | 0,738 | |
| *p\_value* | | | 0,343 | | | | 0,333 | |

This result shows that when the volatility in the exchange rate is low, businesses can endure it, avoiding price changes, causing market share disturbance, and therefore low pass-through. However, when exchange rate volatility becomes high, an adjustment of prices to fully reflect the change in exchange rates is necessary to maintain stable and safe operations for the business, thus leads will increase in the same direction as exchange rate volatility.

## **4.4 Growth of industrial production as transition variable**

**Table 4.19: Results with growth of industrial production as transition variable**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Coefficient** | | | **Std. Error** | | **t-Statistic** | **Prob.** |
| **Threshold Variables (linear part) G = 0** | | | | | | | |
| c | 0,120 | | | 0,054 | | 2,234 | 0,027 |
| er | 0,105 | | | 0,053 | | 1,992 | 0,048 |
| er (-1) | -0,118 | | | 0,083 | | -1,425 | 0,156 |
| er (-2) | -0,024 | | | 0,040 | | -0,605 | 0,546 |
| **Threshold Variables (nonlinear part) G = 1** | | | | | | | |
| c | 0,017 | | | 0,081 | | 0,212 | 0,832 |
| er | -0,143 | | | 0,084 | | -1,697 | 0,091 |
| er (-1) | 0,304 | | | 0,093 | | 3,265 | 0,001 |
| er (-2) | -0,082 | | | 0,081 | | -1,012 | 0,313 |
| **Non-Threshold Variables** | | | | | | | |
| inf\_sa (-1) | 0,619 | | | 0,083 | | 7,435 | 0,000 |
| inf\_sa (-2) | 0,128 | | | 0,092 | | 1,400 | 0,163 |
| iip\_sa | -0,006 | | | 0,009 | | -0,715 | 0,475 |
| iip\_sa (-1) | 0,017 | | | 0,008 | | 2,015 | 0,045 |
| iip\_sa (-2) | 0,003 | | | 0,010 | | 0,328 | 0,743 |
| iip\_sa (-3) | -0,023 | | | 0,014 | | -1,574 | 0,117 |
| iip\_sa (-4) | 0,005 | | | 0,009 | | 0,560 | 0,576 |
| iip\_sa (-5) | -0,006 | | | 0,009 | | -0,696 | 0,487 |
| iip\_sa (-6) | -0,001 | | | 0,011 | | -0,053 | 0,958 |
| iip\_sa (-7) | -0,005 | | | 0,008 | | -0,547 | 0,585 |
| iip\_sa (-8) | -0,024 | | | 0,010 | | -2,517 | 0,013 |
| iip\_sa (-9) | 0,015 | | | 0,009 | | 1,653 | 0,100 |
| gpi | 0,030 | | | 0,006 | | 4,565 | 0,000 |
| gpi (-1) | 0,018 | | | 0,006 | | 3,190 | 0,002 |
| **Slopes** | | | | | | | |
| Slope | 63,338 | | | 362,057 | | 0,175 | 0,861 |
| **Thresholds** | | | | | | | |
| Threshold | 0,902 | | | 0,071 | | 12,684 | 0,000 |
| R-squared | | 0,724 | | | Mean dependent var | | 0.554 |
| Adjusted R2 | | 0,691 | | | S.D. dependent var | | 0.656 |
| S.E. of regression | | 0,365 | | | Akaike info criterion | | 0.924 |
| Sum squared resid | | 25,804 | | | Schwarz criterion | | 1.297 |
| Log likelihood | | -76,725 | | | Hannan-Quinn criter. | | 1,075 |
| F-statistic | | 22,117 | | | Durbin-Watson stat | | 2,051 |
| Prob(F-statistic) | | 0,000 | | |  |  |  |
|  | | | **G = 0** | | | **G = 1** | |
| SR ERPT | | | 0,105 | | | -0,038 | |
| *p\_value* | | | *0,0145* | | | *0,484* | |
| LR ERPT | | | -0,145 | | | 0,166 | |
| *p\_value* | | | *0,650* | | | *0,671* | |

Using the growth of industrial output to proxy Vietnam's economic cycle, the empirical results show evidence of the asymmetric exchange rates pass-through into the economic cycle. In the short run when the economy shrinks ERPT increases, while ERPT decreases as the economy expands. In the long run, the ERPT coefficient represents the economic cyclical consensus, in particular, ERPT will be higher when the economy is in an expansion state compared to when the economy is in recession.

Findings from this section in Vietnam that ERPT are influenced by economic cycles are similar to those found by Nogueira and León-Ledesma (2008), Correa and Minella (2006), Goldfajn and Werlang (2000), Cheikh (2012).

## **4.5** **Trade openness as transition variable**

**Table 4.23: Results with Trade openness as transition variable**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Coefficient** | | **Std. Error** | | **t-Statistic** | | **Prob.** | |
| **Threshold Variables (linear part) G=0** | | | | | | | | |
| c | 0,003 | | 0,003 | | 0,943 | | 0,350 | |
| er | 0,119 | | 0,156 | | 0,760 | | 0,451 | |
| er(-1) | 0,420 | | 0,210 | | 1,995 | | 0,052 | |
| er(-2) | -0,226 | | 0,157 | | -1,443 | | 0,155 | |
| er(-3) | 0,267 | | 0,134 | | 1,991 | | 0,052 | |
| **Threshold Variables (nonlinear part) G=1** | | | | | | | | |
| c | 0,008 | | 0,005 | | 1,589 | | 0,118 | |
| er | -0,308 | | 0,372 | | -0,828 | | 0,412 | |
| er(-1) | -1,434 | | 0,422 | | -3,396 | | 0,001 | |
| er(-2) | -0,212 | | 0,506 | | -0,418 | | 0,677 | |
| er(-3) | 0,473 | | 0,519 | | 0,912 | | 0,366 | |
| **Non-Threshold Variables** | | | | | | | | |
| inf\_sa(-1) | 0,992 | | 0,135 | | 7,342 | | 0,000 | |
| inf\_sa(-2) | -0,368 | | 0,148 | | -2,489 | | 0,016 | |
| imp | 0,000 | | 0,001 | | -0,076 | | 0,940 | |
| opg | 0,002 | | 0,001 | | 2,025 | | 0,048 | |
| opg(-1) | -0,040 | | 0,048 | | -0,844 | | 0,403 | |
| **Slopes** | | | | | | | | |
| Slope | 915.061 | | 1436.498 | | 0.637 | | 0.527 | |
| **Thresholds** | | | | | | | | |
| Threshold | 0,017 | | 0,002 | | 9,755 | | 0,000 | |
| R-squared | | 0,772 | | Mean dependent var | | | | 0,018 |
| Adjusted R-squared | | 0,699 | | S.D. dependent var | | | | 0,017 |
| S.E. of regression | | 0,009 | | Akaike info criterion | | | | -6,300 |
| Sum squared resid | | 0,004 | | Schwarz criterion | | | | -5,741 |
| Log likelihood | | 228,066 | | Hannan-Quinn criter. | | | | -6,079 |
| F-statistic | | 10,567 | | Durbin-Watson stat | | | | 1,649 |
| Prob(F-statistic) | | 0,000 | |  | |  | |  |
|  | | | | **G= 0** | | **G = 1** | | |
| SR ERPT | | | | 0,119 | | -0,189 | | |
| *p\_value* | | | | *0,655* | | *0,583* | | |
| LR ERPT | | | | 0,779 | | -1,211 | | |
| *p\_value* | | | | *0,081* | | *0,303* | | |

In the short term, the results show a negative relationship between trade openness and exchange rate pass-through. Specifically, when the trade openness is below the threshold the transmission will be higher at 0.119. Meanwhile, when the volatility of the exchange rate surpasses the threshold, the pass-through will drop to -0.189. Long-term results also show a decrease in exchange rate pass-through when trade openness exceeds threshold levels.

The results from the study show that the firm pricing power in different openness levels may be causing the above results. As the openness level increases meaning that the level of competition in the economy also increases significantly, firms are less likely to move changes in exchange rates into prices than when openness remains. Consequently, ERPT is lower.

# **Chapter 5: CONCLUSION AND POLICY IMPLICATIONS**

**Table 5.1: Summary results from STR models**

|  |  |  |  |
| --- | --- | --- | --- |
| **Transition variable** | **ERPT Coefficient** | **Below the threshold**  **G = 0** | **Above the threshold**  **G = 1** |
| **Inflation**  c = 1,195  γ = 31,453 | *Short-run* | 0,010 | 0,100\*\* |
| *Long-run* | -0,483 | 1,396\*\* |
| **Exchang rate changes**  c = 0,094  γ = 267,439 | *Short-run* | 0,115\*\*\* | -0,082\*\*\* |
| *Long-run* | 1,079\*\*\* | -0,994\*\*\* |
| **Exchange rate volatility**  c = 1,962  γ = 8,642 | *Short-run* | -0,109\*\* | 0,168\* |
| *Long-run* | -0,311 | 0,738 |
| **Economic cycle**  c = 0,902  γ = 63,338 | *Short-run* | 0,105\*\* | -0,038 |
| *Long-run* | -0,145 | 0,166 |
| **Trade openness**  c = 0,017 γ = 915,061 | *Short-run* | 0,119 | -0,189 |
| *Long-run* | 0,779\*\* | -1,211 |

Firstly, the exchange rate pass-through in Vietnam will positively correlate with the level of inflation in the economy in the short and long run. When the inflation rate in the economy is greater than the threshold of 1.195%/month, the pass-through will increase significantly. Therefore, the government should implement stabilization policies to keep average monthly inflation below the threshold to avoid creating persistent expectations in inflation to contribute to the increase in exchange rate pass-through.

Secondly, there is an inverse relationship in the short and long run between the change in the exchange rate and the exchange rate pass-through. This suggests that there is no evidence of short or long-term “menu cost” issues but that there is evidence of “market share problem” during the research period in Vietnam. Results from the study show that firms will adjust prices in response to sub-threshold changes in exchange rates ignoring the issue of menu costs. However, the pressure of holding market share will partly cause businesses to limit price adjustments when the exchange rate fluctuates beyond the threshold. Small and gradual changes in selling prices due to exchange rate changes may be less noticeable to consumers than a sudden, large change in price. Through this evidence, it can be seen that the market share factor is always concerned by businesses.

Therefore, the government needs solutions to promote fair competition of businesses in the economy and limit monopolies, especially monopolies in essential commodities such as gasoline, medicine, electricity, telecommunications. That can be a suggestion for the policy to stabilize inflation in the long term. Because the fair competition of businesses will make businesses more careful every time they change their selling prices, especially during periods of strong exchange rate fluctuations. In the long term, the government also needs to keep the exchange rate stable at a reasonable level. Because when exchange rate fluctuations exceed the threshold and persistently will reduce the tolerance of businesses and the race to keep market share will beat turn on small and vulnerable businesses.

Next, the results show that firms will pass on more exchange rate changes to prices when they perceive the exchange rate risk in the market increasing. When the level of exchange rate risk is low (the price fluctuation is irregular and sudden), businesses will suffer to maintain market share, but when the volatility in exchange rate increases, the business will act against Bringing these fluctuations into the price causes the pass-through to increase. Thus, the solution to promote healthy competition is still useful in this situation to control inflation naturally. In the context of integration, the flexibility of the exchange rate will gradually increase to absorb shocks, then synchronize with it, the government must promote the level of competition in the economy to partially curb inflation. Large and sudden exchange rate shocks could be an amplifying factor for inflation in the economy.

Besides, the results from the study show that the transmission level is negative with the short-term economic cycle but positively with the long-term economic cycle. In the short term, when the economy booms, it will reduce the transmission rate, but in the long term when the economy is favorable, the transmission rate will increase, so the government should take this into account in the process of operating the economy. Because, when the economy is in a period of high and continuous growth, it will create favorable conditions for businesses to translate changes in exchange rates into selling prices, so the government needs to intervene properly to avoid inflation outbreaks in these periods.

Lastly, the trade openness shows that the market opening is low, the pass-through will be higher than when the economy is more open in the short and long term. This shows that the competitive pressure between enterprises when the economy is more open contributes to reducing the pass-through of exchange rates into prices. Thus, the policy of opening up the economy to welcome foreign enterprises to do business in Vietnam can bring about a more competitive environment, thereby helping to neutralize the movement in exchange rates to the levels price.

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# **THESIS-RELATED LIST OF AUTHOR’S PUBLICATIONS**

**A. Scientific jounals**

1. Quách Doanh Nghiệp, Nguyễn Thị Ngọc Trang, Nguyễn Hoàng Thụy Bích Trâm (2018*).* Ảnh hưởng của độ mở thương mại đến mức độ truyền dẫn tỷ giá hối đoái vào lạm phát ở Việt Nam. *Tạp chí Khoa học – Đại học Mở Tp.HCM,* Số 63(6) – Năm 2018
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**B. Scientific researches**

1. University level (2017), “Ảnh hưởng của tình trạng đô la hóa và độ mở thương mại đến mức độ truyền dẫn tỷ giá hối đoái vào lạm phát ở Việt Nam” - Excellent rated

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