EFFECTS OF EXCHANGE RATE PASS-THROUGH ON INFLATION IN VIETNAM

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Abstract - The main purpose of this study is to investigate the effect of exchange rate pass-through (ERPT) on domestic price of goods and services in Vietnam under the impact of the interest rate and refinancing rate over the period 2014 to 2019. Unit root test and many Diagnostic tests are conducted before applying the Vector Auto Regressive (VAR) model. Estimation results indicate that exchange rate changes have a positive impact on domestic consumer price level means that an increase in the depreciation of Vietnam dong could cause an increase in domestic price, the degree of ERPT into domestic price level is smaller than interest rate and refinancing one. The study also indicates many problems existing in the actual situation in Vietnam. From those analysis results, the study has proposed monetary policy orientations to help stabilize prices and develop macroeconomics.

Key words - Exchange rate pass-through; inflation; VAR model; monetary policy; Vietnam

1. Introduction

Inflation is used to measure the consumer price level movements of a basket of goods and services over period of time, usually a month. The degree of inflation has effects on the costs of living of people in a country. With the high inflation, it is difficult for investors to estimate the real value of the profits in the future, so it will affect the decision of investment. High inflation also raises the opportunity cost of holding money because the value of money would decrease over time. Therefore, high inflation could potentially erode economic gains and change the growth itinerary of the economy. Inflation is influenced by several factors; they are divided into cost-push and demand-pull types. Cost-push inflation is the inflation that occurs when several types of costs increase simultaneously throughout the economy, and demand-pull inflation is inflation that occurs due to the rising of aggregate demand. A change in the exchange rate has a direct impact on the price of imported goods including the intermediate materials and final products. This effect is known as imported inflation, besides, it also affects the foreign and domestic aggregate demand indirectly, thus the effect of exchange rate movements on inflation could be considered a mixed factor causing inflation. According to the transmission mechanism of the effect of exchange rate fluctuation on the pricing of imported goods and services, exchange rate is also used as a tool to manage macroeconomic indicators, including inflation by the State bank of Vietnam. In the world, over the past two decades, a great deal of economic literature has been studied to understand the effect of exchange rate pass-through on inflation, but the results are inconsistent as research results are various in different economies.

In Vietnam, the major international trading and Foreign Direct Investment (FDI) currency are almost the US Dollar (USD), so it is not surprising that any changes in the exchange rate of USD against Vietnam dong (VND) would affect the economy of Vietnam. Therefore, the key question to ask is what role the changes in the major currency does, such as the dollar play in determining the behavior of domestic prices of goods and services. This question has implications for international transmission mechanism and the design of optimal monetary policy in an open economy [1].

Exchange Rate Pass-Through (ERPT) is the process by which exchange rate depreciation or appreciation could be translated into domestic prices of goods and services. The State bank of Vietnam has to ensure that the amount of exchange rate fluctuation that is translated into domestic prices does not lead to distortions in the general price levels. Sometimes the exchange rate pass-through could create domestic disruption and prevent the expected gains of international competitiveness [2], so there is often a reluctance to allow the exchange rate to adjust freely. Thus, an important challenge for economic policymakers is how much exchange rate movements is translated into domestic inflation and economic activity.

Besides, in the case that the State bank of Vietnam has adopted several significant changes in monetary policy over time, the key question is whether with many changes in monetary policy, the pass-through rate will be any different. Understanding more clearly the impact of ERPT on consumer price inflation helps to make a better judgment on state policies and also helps to build policies aimed at stabilizing prices in Vietnam. In light of these, this study attempts to investigate the relationship between exchange rate and inflation from the monetary policy point of view in Vietnam during the period 2014-2019. Unlike previous studies in this research area, which mainly used nominal effective exchange rate **(**NEER) and real effective exchange rate (REER) to measure ERPT, this paper employs the bilateral exchange rate between VND and USD to examine the pass-through of the exchange rate into inflation.

2. Literature review

2.1. Exchange rate pass-through

Goldberg and Knetter [3] defined exchange rate pass-through as "the percentage change in local currency import prices resulting from a one percent change in the exchange rate between the exporting and importing countries".

However, this definition was also extended to producer and consumer prices. The authors divided exchange rate pass-through into two types, with a one percent change in exchange rate, if the percentage change of local price is one, it is the complete exchange rate pass-through. The ERPT is partial or incomplete if the percentage of import price changes is less than the percentage change in the exchange rate. Following Shambaugh [4], for each country, the exchange rate pass-through ratio is defined as the ratio of the response of country-specific inflation to the response of the nominal exchange rate changes following a given shock.

2.2. Previous empirical studies about the Exchange rate pass-through on Inflation

During previous decades, there are many studies concerning exchange rate pass-through, they can be classified as micro level and macro one. At the micro level, studies focused on examining ERPT into import price of specific domestic industries. At the macro level, studies were conducted to examine ERPT into aggregate price indices and can be further classified into two categories. The first category is the degree of pass-through into aggregate import prices and the second one is the pass-through into the consumer prices. These were conducted on country level as well as cross-country comparisons.

Ito and Sato [5] researched ERPT in post-crisis Asian economies and also found that the degree of ERPT varies by the different price indices: the pass-through effect on the import price index is the largest, the second is on producer price index (PPI) and the smallest is on consumer price index (CPI). Chew, et al. [6] also analyzed ERPT for Singapore, their findings reveal that the ERPT to import prices is complete, and ERPT to consumer price is quite modest, particularly, when the exchange rate appreciate 1%, domestic prices will decline 0.1% in short-run and 0.4% in long-run. Aliyu, et al. [7] also show that the ERPT decreases along the pricing chain in Nigeria.

Several other studies were conducted to research the degree of ERPT to inflation that mentioning the role of monetary policy. Mwase [8] examines the effect of ERPT on consumer prices in Tanzania with the Structural Vector Autoregressive (SVAR) model using quarterly data from 1990Q1 to 2005Q1. The findings show that the effect of exchange rate movements on consumer price is low and persistent during the research period. He also analyzed the effect of monetary policy regime changes on ERPT, he divided the sample period into before and after 1995. Sample 1 (before 1995) is the period that inflation and exchange rate are high and volatile, in sample 2 (after 1995), inflation is decrease and stable, and exchange rate experiences a depreciation. The result is that ERPT is very low in the second sample. Frimpong and Adam [9] analyzed the effect of ERPT on consumer prices in Ghana using VAR models. They state that the increased openness and tighter monetary policy of Central bank affected on the degree of ERPT. Particularly, they found that the ERPT is low but significant in the short-run, and it is zero in the long-run.

Ca'Zorzi, et al. [10] estimate the magnitude of ERPT in emerging economies. Their findings partly overturn the conception that the ERPT is higher in emerging economies than in developed economies. They found that in emerging economies with low inflation, the ERPT to consumer price is low like in developed countries. They also indicated the ERPT will be low with low inflation and found that there is a positive relation between ERPT and inflation. Bouakez and Rebei [11] tested that whether the ERPT decreased when the Bank of Canada shift to an inflation targeting regime. The result is the ERPT to consumer price is lower, thus it also supports the hypothesis of Taylor [12].

3. Research Methodology

3.1. Model Specification

This study examines the impact of exchange rate pass-through on inflation under the impact of monetary policy, so the CPI variable will be a dependent variable, varying according to the change of the independent variable EXC (exchange rate), and there are also two explanation variables, INR (interest rate) and MPR (refinancing rate) - represent changes in monetary policy. This model was used by Anyoka [13] in his research paper to measure the impact of ERPT on inflation in Ghana. In this study, his model is applied and the model of the study is as follows:

$$CPI_t = f(EXC_t + INR_t + MPR_t) \quad (1)$$

Where: CPI_t= Consumer prices index at time t;

EXC_t = Exchange rate (VND per USD) at time t;

INR_t = Interest rate at time t;

MPR_t = Refinancing rate at time t.

3.2. Data Specification

The data used in this empirical study are in form of time series data, which are monthly collected through the period 2014-2019 in Vietnam. Data is only updated to 2019 to avoid biasing the study's estimates from the impacts of the Covid 19 pandemic. The data set includes four variables (consumer price index, exchange rate, interest rates and refinancing rate), each variable has 72 observations sourced from International Monetary Fund (IMF) Indicators Database.

Table 1. *Overview of variables*

Variable	Obs	Mean	Std. Dev.	Min	Max
CPI	72	152.136	7.553672	142.489	168.831
EXC	72	22148.6	637.9689	21036	23162
INR	72	7.48156	0.654551	6.94	9.63
MPR	72	6.39583	0.181688	6	7

Source: Research results of the authors

3.3. Estimation method

The study used Vector Auto-Regressive (VAR) model testing technique. VAR model first developed by Christopher H. Sims in 1980 for estimating the nexus among macroeconomic variables is a multivariate forecasting algorithm that is used when two or more-time series influence each other. VAR is a stochastic process model used to capture the linear interdependencies among multiple time series.

In an economic relationship, the variables are not only affected in one way, which means that the independent variable would not always affect the dependent variable in

one direction. In this case, a macroeconomic variable is influenced not only by its past values but also by the lagged values of other variables. Therefore, the VAR model is more suitable for studying the relation among macro variables such as CPI, EXC, INR and MPR. The VAR model is better than the OLS model because VAR model improves limitation of OLS regarding nonstationary issues, and it identifies the contemporaneous impacts among variables, so it is better than unique direction impact in OLS model [14].

To estimate the predictive power of exchange rate, interest rate and refinancing rate on domestic price levels, the VAR model employed was as follows:

$$\Delta CPI_t = \delta_0 + \sum_{t=1}^{p} \beta_{1i}\, \Delta CPI_{t-i} + \sum_{t=1}^{p} \beta_{1i}\, \Delta EXC_{t-i} + \sum_{t=1}^{p} \beta_{1i}\, \Delta INR_{t-i} + \sum_{t=1}^{p} \beta_{1i}\, \Delta MPR_{t-i} + \varepsilon_t \ldots \quad (2)$$

In the model, the variables exchange rate and consumer price index would be the main variables, the variables interest rate and discounting rate is used to describe the effect of monetary policy on a pass-through. The variables are arranged in the above order because several reasons. The variable CPI_{t-1} has the effect on the variable CPI_t because it is assumed that the lags make the variable CPI affecting on itself. The next variable is EXC and so it is influenced by the variable CPI shocks. The variable interest rate is ranked after EXC because it takes into account the money market and responds to exchange rate shocks contemporaneously. The last variable is refinancing rate, it is adjusted according to the evolution of the previous variables and the long-term response.

4. Results and discussion

4.1. Unit root test

It is important to examine whether a time series is stationary. The time series is stationary means that the mean, variance and covariance at different lags remain constant at any time which the series is determined. If it is not stationary, each time series is a separate phase and it cannot generalize the results to other phases. In addition, regression analysis with such series can lead to spurious or nonsense regression, then these tests may be not reliable. This study uses the Augmented Dickey-Fuller test (ADF) to check stationary of variables. The results are shown in Table 2.

Table 2. *The results of ADF Test*

Variables	P-Value
CPI	0.9991
EXC	0.8319
INR	0.0072
MPR	0.0545

Source: Research results of the authors

The ADF test is implemented as unit root tests for variables at their levels. The null hypothesis is that variables are unit root (non-stationary), and the rejection of the null hypothesis is that they are stationary. From the results in Table 2, it could be seen that INR is stationary at its level. However, the null hypotheses of CPI, EXC, and MPR are not rejected, it means that they are non-stationary. In this case, checking the stationary at the first difference of variables is conducted by using the Augmented Dickey-Fuller test (ADF), and presented in Table 3.

Table 3. *The results of ADF Test at first difference*

Variables	P-Value	Lags	I
dCPI	0.0003	1	I(1)
dEXC	0.0000	1	I(1)
dINR	0.0000	1	I(1)
dMPR	0.0000	1	I(1)

Source: Research results of the authors

The ADF test is implemented as unit root tests for CPI, EXC, INR, and MPR at the first difference. The P-value indicates that the null hypotheses are all rejected at 5% significant. It means that the variables are all stationary at first difference. The findings reveal that the variables of CPI, EXC, INR, and MPR are first-difference stationary - I(1).

4.2. Diagnostic tests

Diagnostic tests are conducted to know whether there is heteroscedasticity phenomenon, and the model is normality. The Heteroscedasticity phenomenon occurs when the standard deviations of a predicted variable, monitored over different values of an independent variable or as related to prior periods, are non-constant. Heteroscedasticity is a case of violating the assumptions of the linear regression model. It does not affect the consistency of the regression estimate, but it can lead to errors in the conclusion. When a variance error occurs, the estimates no longer have the smallest variance or efficiency estimates, and the result would be unreliable. A normality test is used to determine whether the data is in the form of a normal distribution. Because the assumption of various statistical methods used for data analysis is normality, including regression, and analysis of variance.

Table 4. *The results of Diagnostic Test*

Diagnostic test	P-value
Heteroscedasticity	0.3069
Normality	0.4149

Source: Research results of the authors

The tests' results show that there is no heteroscedasticity phenomenon, and the variables are normally distributed, and thus, the analysis results could be reliable.

4.3. Estimation Results

The Vector Auto-regressive model is used to estimate the effect of exchange rate pass-through on the domestic price with interest rate and refinancing rate as explanatory variables. Before estimating the regressive model, it is important to select the number of lags for the model. There are many methods to select the lag length for a VAR model. The study employs Akaike's information criterion (AIC) method to find the appropriate lag length in the model. It was found that 1 is the optimal lag length, and then the autocorrelation test was implemented to know whether with the model exists autocorrelation phenomenon at one lag.

The null hypothesis is no serial correlation in the model, the result shows that P-value is 0.08 that is more

than 0.05. It means that the null hypothesis is accepted and there is no autocorrelation phenomenon in the model. Finally, the VAR model could be run with one lag length, and the result is presented in Table 5.

Table 5. *The result of VAR model*

	dCPI(-1)	dEXC(-1)	dINR(-1)	dMPR(-1)	C
dCPI	0.4744	0.0002	0.5519	-1.5016	0.191

Source: Research results of the authors

From the above results, it could be seen that the correlation coefficient between CPI and itself on the previous month is very high (0.4744) and this is the positive effect. It means that if CPI of the previous month increases 1%, CPI of this month would increase 0.4744% and. The variable of exchange rate also has positive effects on domestic price at the first lag, and the correlation coefficient is quite low, 0.0002. In other words, when the exchange rate of the previous month rises 1%, the domestic price of this month will increase accordingly 0.0002%. Similarly, the effect of interest rate on consumer price is positive too, specifically, with 1% changes of interest rate in the previous month would cause 0.5519% changes in CPI in this month. Meanwhile, the refinancing rate has a negative effect on the domestic price at the first lag, it means the domestic price in this month will rise (1.5016%) when the discounting rate of the previous month decreases 1%.

To know more clearly about the degree of the effects of independent variable on the dependent variable, the Variance Decomposition is conducted. The Variance Decomposition is used to determine the contribution of each variable in explaining the changes of the remaining variable. This study will implement the Variance Decomposition of the variables in the period of 12 months.

Table 6. *Variance Decomposition of dCPI*

Period	S.E.	dCPI	dEXC	dINR	dMPR
1	0.4959	100	0	0	0
2	0.5616	91.6079	0.0989	4.6863	3.6068
3	0.5780	89.7482	0.1918	6.1687	3.8912
4	0.5819	89.3231	0.2108	6.5033	3.9626
5	0.5829	89.2206	0.2155	6.5842	3.9795
6	0.5831	89.1956	0.2167	6.6039	3.9836
7	0.5832	89.1894	0.217	6.6088	3.9846
8	0.5832	89.1879	0.2170	6.6100	3.9849
9	0.5832	89.1876	0.2170	6.6103	3.9850
10	0.5832	89.1875	0.2170	6.6103	3.9850
11	0.5832	89.1874	0.2170	6.6104	3.9850
12	0.5832	89.1874	0.2170	6.6104	3.9850

Source: Research results of the authors

The results of analysis of CPI variance decomposition show that the change of CPI mainly comes from its endogenous. In the first month, the change in CPI is entirely affected by itself (100%), after that it tends to decrease in many following months but still very high (at 89.19%) in the 12th month. The variables dEXC, dINR, and dMPR partly explain the change in CPI and all of these tend to increase over time. Specifically, the effects of exchange rate variable increases steadily, and explains about 0.22% in the period of twelve months. The effect of exchange rate and monetary policy variables are smaller than interest rate. The degree of interest rate's effect gradually increases and explains from 0% in the first month to 6.61% in the 12th month.

5. Discussions

From the results, it could be seen that the correlation coefficient is 0.0002, besides that, the result of Variance Decomposition shows the exchange rate is 0-0.22% in the period of twelve months. The correlation between exchange rate and consumer price inflation is quite low, this falls in line with the results of [5] and [14], who found that exchange rate movements have the lowest effect on domestic consumer price. The exchange rate pass-through coefficient on Vietnam's consumer price is quite low, which implies that the domestic price might depend mainly on other factors rather than USD/VND exchange rate. The degree of exchange rate pass-through into domestic consumer price in this period is explained by many reasons.

Firstly, the Vietnam exchange rate regime is managed float regime, and the State bank of Vietnam controls the exchange rate fluctuations within certain amplitude. The State bank has drawn a lot of experiences in controlling the effects of economic shocks on exchange rates with more active and sufficient tools at a macro level. The efficiency of the State bank of Vietnam management on the exchange rate policy whereby the State bank permitted the exchange rate to be more flexible. This also enhanced the development of the derivatives market, hedging the exchange rate risks for credit institutions and enterprises. Therefore, under the flexible control of the State bank to stabilize the economy, the exchange rate of USD and VND did not fluctuate too much, negative effects from the exchange rate changes on the economy, especially inflation, were also reduced. Thus, with the stable exchange rate, it is obvious that it is not the main factor for explaining the movements of consumer price index.

Secondly, the open market operations are flexibly implemented by the State bank of Vietnam, effectively regulating the domestic currency supply, contributing to stabilizing interest rates, prices, and exchange rate, so it limits the level of ERPT to CPI. During the study period, the open market operations were handled flexibly by the State bank and closely followed daily movements of the money market to ensure monetary regulation according to the goals proposed by Government and the State bank of Vietnam. These interventions of the State bank on the open market not only stabilize interest rate and price but also decrease the fluctuation of exchange rate. Thus, if the exchange rate does not fluctuate much, the changes of macro indicators, including CPI, do not originate from the movement of exchange rate but other factors. That is also one of the reasons why the degree of exchange rate pass-through was not high.

Thirdly, the State bank of Vietnam continuously intervenes in the foreign exchange market to stabilize the

foreign exchange supply-demand. Based on market movements and monetary policy management point of view, the State bank will buy/sell foreign currency term with Credit Institutions. The State bank intervention in the foreign exchange market contributes to reduce the impact of economic shocks, reducing the volatility of exchange rate, and the effect of exchange rate movements on consumer price would decrease as a result. Thereby the degree of ERPT to consumer price would also decrease. Finally, the State bank of Vietnam continues to control the demand for loaning foreign currency. During this period, Vietnam is still on an itinerary to prevent the dollarization of the economy, the main purpose is to reduce the impact of the dollar changes on the domestic economy. And the reduction of the basic economic dollarization has reduced the impact of exchange rate movements on the economy, when the economy is no longer dependent on the USD, simultaneously, the Government efforts to stabilize the value of VND, the fluctuation of the consumer price index would be clearly not affected by the change of the exchange rate between USD and VND, and obviously the ratio of pass-through would be low.

In conclusion, due to the efforts of the State bank of Vietnam to stabilize the exchange rate as well as inflation, it has somewhat reduced the degree of exchange rate pass-through to consumer price, compared to the previous period. This supported the Taylor's hypothesis that ERPT would be low with low inflation. The study of Campa and Goldberg [15] also showed that countries with less volatile exchange rates and inflation are likely to have lower rates of exchange rate translation into import and consumption prices.

In terms of MPR variable, it shows that the decrease in MPR is inversely correlated with the fluctuation of the CPI, which can be explained for many reasons. The first reason is the gradual reduction of refinancing rate of the State bank of Vietnam clearly demonstrating the intention to pursue an Expansionary Monetary Policy in the long run. An Expansionary Monetary Policy is also known as a monetary policy in which the State bank of Vietnam reduces its lending rate, if the lending rate falls below the market interest rate, commercial banks will continue to lend money to the public until the reserve requirements could reduce to the minimum level allowed because if there is a shortage of cash, they can borrow from the State bank without any losses, thus the money supply will increase. As a result, the interest-sensitive investment and spending sectors will increase, thereby increasing aggregate demand, will promote investment to expand production and business, create jobs for workers, which in turn increases aggregate demand and causes consumer price to rise over time. The other reason is that the State bank reduces the discount rate leading to an increase in money supply, it also affects the degree of ERPT into CPI, because when the domestic currency supply increases, the domestic currency will depreciate compared to the foreign currency, and then follow the direct and indirect ERPT mechanism, it also increases the CPI.

In contrast, the interest rate has significant positive influence on domestic price level, its correlation coefficient is 0.5519 and it has 0-6.61% positive effect on CPI. In the case of Vietnam in this period, although the interest rate of commercial banks in 2019 is still lower than it in 2014, it did not directly fall, it has continuously fluctuated up and down and is generally still high. A high interest rates increases production costs and thereby increasing prices because high interest rates would increase the cost of borrowing for businesses, to ensure profits, businesses are forced to transfer part of the high interest rate burden to consumers, leading to the aggregate level of consumer price increases.

6. Conclusion and Policy implication

The exchange rate changes have a positive impact on domestic consumer price level means that an increase in exchange rate (the depreciation of VND) could cause an increase in domestic price. However, the correlation between exchange rate and consumer price level is weaker than the previous studies conducted in Vietnam, in other words, the degree of ERPT into domestic price level gradually decreases over the period. Although there are many economic shocks in the world affecting the value of the dollar, the ERPT into CPI level is still low, this is explained by the degree of intervention by the Government to stabilize the exchange rate and maintain the value of VND to prevent inflation is rising gradually. The efforts of the Government are highly effective in limiting price increase and preventing inflation, but it also has the risk of creating political and trade problems such as being put on the watch list of countries manipulating currency by the United State Department of the Treasury. Therefore, the Government of Vietnam and the State bank of Vietnam need to carefully consider and adjust their interventions.

For the positive influence of interest rate on consumer price level, it could be seen that interest rate is an important factor that affects the fluctuation of inflation. Thus, it reveals that if a country wants to control the increased degree of domestic price, it should manage the interest rate carefully. Specifically, when Vietnam more and more integrates into the world, many economic events in the world, especially changes in the macro indicators of the United State, have increased the rising interest rate pressure, a ripple effect of an increase in domestic price is to be expected according to Vietnam's situation. So, interest rate should be controlled keenly if a country attempts to manage inflation.

Finally, the refinancing rate is found that has the highest degree of effect on the domestic consumer price level even it did not fluctuate much in the research period. However, every time the discounting rate is adjusted, it would influence the price stronger than exchange rate and interest rate. It means that the actions of the State bank of Vietnam to manage money supply to stabilize the macro economy and promote economic growth can lead to higher inflation if they are not controlled carefully. Thus, if it is not necessary, the State bank is not recommended to adjust

the discounting rate, because it can have a big impact on the consumer price, instead, the State bank of Vietnam can use other tools to intervene such as open market operations, reserve requirements, managing market expectations and so on, these could be implemented thoroughly to protect the sustainable development from economic shocks.

REFERENCE

[1] Taylor, J. B., "The role of the exchange rate in monetary-policy rules", *American economic review*, vol. 91, 2001, pp. 263-267.

[2] Razafimahefa, M. I. F., *Exchange rate pass-through in sub-Saharan African economies and its determinants*: International Monetary Fund, 2012.

[3] Goldberg, P. K., & Knetter, M. M., "*Goods prices and exchange rates: what have we learned?",* ed: National Bureau of Economic Research Cambridge, Mass., USA, 1996.

[4] Shambaugh, J., "A new look at pass-through", *Journal of International Money and Finance*, vol. 27, 2008, pp. 560-591.

[5] Ito, T., & Sato, K., "Exchange rate changes and inflation in post-crisis Asian Economies: Vector Autoregression Analysis of the exchange rate pass-through", *Journal of Money, Credit and Banking*, vol. 40, 2008, pp. 1407-1438.

[6] Chew, J. và cộng sự, *An Empirical Analysis of Exchange Rate Pass-through in Sngapore*: Monetary Authority of Singapore, 2009.

[7] Aliyu, S. U. R. và cộng sự, "Exchange rate pass-through in Nigeria: Evidence from a vector error correction model", *Munich Personal RePEc Archive*, No. 25053, posted 16, 2010, pp. 1-29.

[8] Mwase, N., "An empirical investigation of the exchange rate pass-through to inflation in Tanzania", *IMF Working Papers 06(150)*, 2006. DOI:10.5089/9781451864106.001

[9] Frimpong, S., & Adam, A. M., "Exchange rate pass-through in Ghana", *International Business Research*, vol. 3, 2010, pp. 186-192.

[10] Ca'Zorzi, M. và cộng sự, "*Exchange rate pass-through in emerging markets*", Eupopean central bank, No 739, 2007.

[11] Bouakez, H., & Rebei, N., "Has exchange rate pass-through really declined? Evidence from Canada", *Journal of International Economics*, vol. 75, 2008, pp. 249-267.

[12] Taylor, J. B., "Low inflation, pass-through, and the pricing power of firms", *European economic review*, vol. 44, 2000, pp. 1389-1408.

[13] Anyoka, D. A., "*Effect of exchange rate pass through on domestic price levels in Ghana*", Master of Business Administration degree in Finance, University of Cape Coast, 2020.

[14] McCarthy, J., "Pass-through of exchange rates and import prices to domestic inflation in some industrialized economies", *Eastern Economic Journal*, vol. 33, 2007, pp. 511-537.

[15] Campa, J. M., & Goldberg, L. S., "Exchange rate pass-through into import prices", *The Review of Economics and Statistics*, vol. 87, 2005, pp. 679-690.