Exchange Rate Pass-Through to Inflation and Its Effect on Economic Growth in a Dollarized Economies: The Case of Southeast Asian Countries

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Abstract

This paper aims to investigate the impact of exchange rate pass-through in dollarized economies to domestic inflation and economic growth: evidence from Southeast Asian countries. The panel data for five selected countries (Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam) over the period 2000-2015 is employed. The empirical results by using fixed effects estimation found that there is no direct impact of currency depreciation and dollarization degree to domestic inflation and economic growth. However, the result indicates the indirect impact of exchange rate pass-through in dollarized economies across selected countries. It reveals that the coefficient of interaction term variable between currency depreciation and dollarization degree is significant and correlated with domestic inflation and economic growth. For instance, the level of dollarization increases the exchange rate pass-through and it also suggests a positive and significant relationship to domestic inflation. Likewise, higher degree of dollarization also increases the exchange rate pass-through coefficient and it has a negative and significant correlation to economic growth. The regression analysis shows that there is quite large pass-though coefficient in highly dollarized economies across five selected countries. It estimates of 0.72 to 0.9 percent, which is consistent with the accepted view that there is the large pass-through coefficient in high dollarized economies.

Keywords: Inflation; Exchange rate pass-through; Dollarization; Fixed Effects Estimation

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I. Introduction

Exchange rate pass-through is defined as "percentage change of the domestic currency import prices arising from one percentage change in the exchange rate between exporting and importing countries."[1] The linkage between exchange rate pass-through and inflation rate has been discussed and concentrated by many economists and researchers in the late 1980s. It also becomes a main concern and significance for international finance, especially for exchange rate regimes and monetary policy. Because of the pass-through degree in exchange rate changes has put pressure on the domestic inflation that results in uncertainty of economic structures, especially monetary policy. For example, the high pass-through in the price of import means that the fluctuation of nominal exchange rate leads to higher expenditure because the price of import becomes more expensive, driving to higher domestic inflation. As a result, it leads to an inefficiency of monetary policy. On the other hand, the lower pass-through in import price implies the uncertainty of the nominal exchange rate which guides to lower spending and an efficiency of monetary policy. Consequently, it would stimulate economic growth.

Similarly, the high domestic inflation and uncertainty of economic structures within a country are not only caused by exchange rate pass-through to import price, but also another factor such as degree of dollarization that contributes to the weaker growth and ineffectiveness of independent monetary policy. Recently, the consideration on dollarization policy has been taken place in most developing and transitional economies. In fact, there have been some empirical evidences on the relationship of exchange rate pass-through and inflation. However, most of the research have only been emphasized on emerging and developed economies while only few studies conducted in developing and transitional economies by including the economic dollarization into their regression model. For instance, Edwards et al. (2003) highlights that the economic growth in dollarized economies is lower than that of non-dollarized economies. Besides, Carranza et al. (2009) states that a country with high degree of dollarized economy presents higher inflation pass-through.

Most of the studies did not cover the specific case of Southeast Asian countries, so this research paper aims to investigate the relationship of exchange rate pass-through in dollarized economies to inflation and economic growth in the case of Southeast Asian countries owing to the fact that those countries have been facing with high financial dollarized economies more than two decades. Therefore, the paper will address the research question that how does the exchange rate pass-through in dollarized economies, particularly Southeast Asian countries, affect domestic inflation

[1] Goldberg, P.K. & Knetter, M.M., (1997), p. 1248.

and economic growth? Which it has two main objectives. First objective is to examine the matters of exchange rate pass-through in high degree of dollarization to domestic inflation and secondly is to test the effect of exchange rate pass-through in dollarized economies on economic growth.

The panel data for the selected high and moderate financial dollarized economies in Southeast Asia including Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam over the period 2000-2015 is employed in this empirical study. Additionally, the dynamic panel model with fixed effects estimation is considered to capture the effect of exchange rate pass-through in dollarized economies to inflation and economic growth.

The key findings suggested that the level of dollarization increases the exchange rate pass-through. There is a positive and significant relationship of exchange rate pass-through in dollarized economies to domestic inflation. Similarly, the level of dollarization rises the exchange rate pass-through and it has a negative and significant correlation to economic growth. The empirical results in this paper presents the large pass-though coefficient in highly dollarized economies across five selected countries. It estimates of 0.72 to 0.9 percent, which is consistent with the accepted view that there is the large pass-through coefficient in high dollarized economies.

The flow of the paper is proceeded as the following: Section II financial dollarization in Southeast Asian countries. Section III literature reviews. Section IV data and methodology. Section V findings. Section VI conclusion. Section VII limitation of the paper.

II. Financial Dollarization in Southeast Asian Countries

A financial dollarization is a situation that the residents of a country hold a major share of assets in terms of foreign currency, and generally use foreign currency as a medium of transaction within the country. The financial dollarized economy is prevalent in developing and transitional economies. Over two decades, the developing and transitional economies like Southeast Asian countries have been facing with a high degree of dollarization and multiple currency phenomenon because of the increasing trend of share of asset in foreign currency such as deposit bank account, the private companies and households, and high possibility to access loan in both domestic currency and foreign currency.

The situation of dollarization in Southeast Asian countries, especially Cambodia, Lao PDR and Vietnam have been starting since the beginning of their economic reform and open economy with other country in late 1986s. Since then the use of dollars as a medium of transaction has been widen as there is lack confidence in domestic currency in those countries. For instance, during the financial crisis in 1997 the proportion of holding dollars is dramatically increased. Moreover, bilateral trade also puts more pressure to those countries in terms of holding more foreign currency which contributes to higher dollarization degree. Therefore, in order to avoid and

protect themselves from the currency depreciation, holding foreign currency is the better choice.

Regarding to the degree of dollarization that classified by Balino et al. (IMF, 1999)[2], the data during 2000-2015 indicates that the share of foreign currency in circulation in Cambodia is the highest, the average of 77 percent; Lao PDR is the second highest roughly 55 percent. For other countries such Indonesia, the Philippines and Vietnam are classified to be the moderate dollarized economies (See Appendix Table 1).

In the case of Cambodia, the situation of dollarization is obviously different from other countries since the using of dollars is widespread more officially than domestic currency, and all the medium transaction for goods and services has been settled in dollars. Therefore, the exchange rate pass-through in a dollarized economy like Cambodia may not be matter that much to its inflation. Likewise, the situation in Lao PDR is unusual since the foreign currency widely use both in dollars and Thai Baht as a medium of transaction, and both currencies are more than half of the currency in circulation. But, all the payment systems in the economy has been settled in local currency. Thus, foreign currency has to convert into local currency through the exchange rate. Similarly, for other sample countries such as Indonesia, the Philippines and Vietnam have also been settled their payment systems in domestic currency. Therefore, using of dollars as medium transaction has to convert via exchange rate.

As the Financial Dollarized Economy is one of the crucial factors that influences the price stability of a country; it has posed a challenging role to a central bank regarding macroeconomic management, particularly for conducting the independent monetary policy and the exchange rate policy. Therefore, the central bank for all countries in Southeast Asia have been concentrated on dollarization policy by trying to reduce the amount of using the dollars, inducing some regulations, and promoting the use of domestic currency as the medium transaction for all goods and services.

III. Literature Review

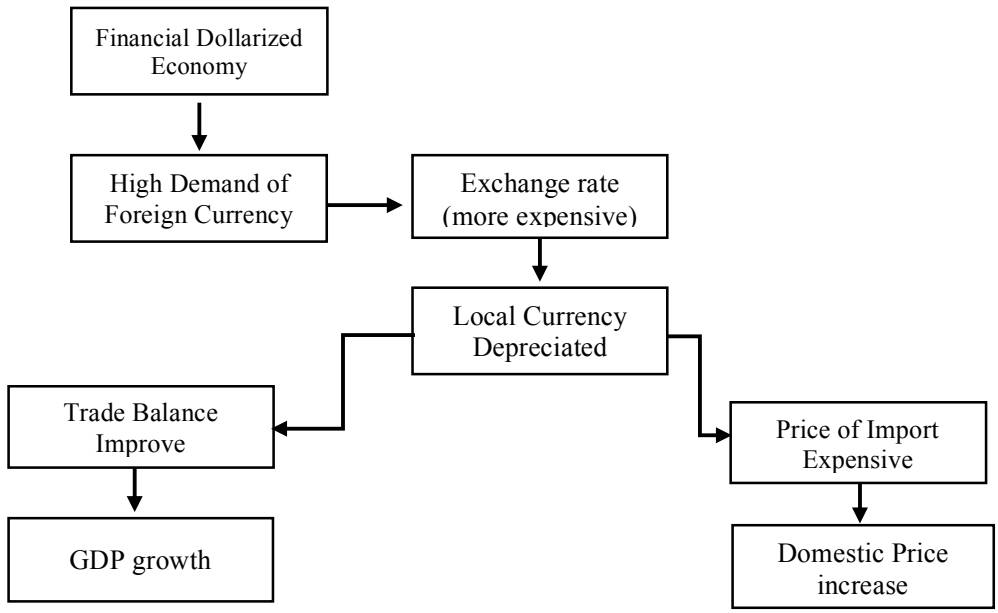
3.1. Exchange Rate Movement in Dollarized Economies

Figure 1 presents the mechanism of the exchange rate movement such as exchange rate pass-through in highly dollarized economies. It can be specified into two channels. Firstly, the direct channel of the exchange rate which has impacts on inflation through the effect of pass-through on the import prices. This means that the increase of import price is influenced by the change of nominal exchange rate. As high degree of dollarization leads to high demanding of holding dollars, it results in local currency depreciation. As a result, the value of import becomes more expensive, which leads to the increase of domestic price or higher inflation rate. Secondly, the

[2] Balino, Bennett and Borensztein (IMF, 1999) measured the degree of dollarization by the share of total foreign currency in the domestic banking system to broad money; where it exceeded 30 percent, classified to be highly dollarized economy; the share between 10 percent to 30 percent is classified to be moderate dollarized economy, and lower than 10 percent, is classified to be lowest financial dollarized economy.

direct mechanism of exchange rate has influence on real gross domestic product via the balance of payments such as the trade balance. The currency depreciation may lead to improvement of trade balance. However, Marshall-Lerner condition states that the currency devaluation can improve the trade balance if the sum of export and import demand elasticity is greater than one (Davidson, Paul., 2009). Therefore, in the case of a country with high degree of dollarization, the currency devaluation might not be improved the economic growth since mostly their economies rely more on import than export. Thus, the devaluation of currency may be caused more trade deficit. As a result, economic growth would be declined.

Figure 1. The Mechanism of Exchange Rate Movement in Dollarized Economies



Source: Author's compilation

3.2. Previous Evidences

Normally, the developing countries experiences the greater pass-through coefficient of exchange rate changes than in advanced economies. For instance, the empirical evidence of 43 industrialized economies, Menon (1995) highlights that the exchange rate pass-through to price level seems to be largely incomplete. However, it is extremely different in magnitude across different countries. Likewise, another study conducted by Goldfajn, I. et al. (2000) with the sample of 71 emerging markets and developed countries found that the pass-through coefficients in emerging countries are increasing and greater overtime than in advanced economies, with its peak at 12 months.

The high pass-through of the exchange rate changes into the price level seems to be greater than other price indices. However, the size of the pass-through in a high

degree of dollarization is also important for many developing and transitional countries due to the implications of the effectiveness of independent monetary policy. Therefore, the causality of exchange rate pass-through to inflation in dollarized economies has been widely discussed and considered for many developing and transitional countries. For example, the previous study by González Anaya, J.A. (2000) examines the exchange rate pass-through to inflation for selected 13 countries in Latin America. His results indicate that in cross countries the dollarization degree is not positively correlated with the large coefficient of exchange rate pass-through, and the increase of dollarization degree is also not associated with the increase of pass-through. Another study of Calvo et al. (2002) also highlights that the high dollarization degree does not seem to be the barrier for controlling the monetary policy, but the high liability dollarization leads to large pass-through.

However, another empirical study conducted by Edwards et al. (2003) found that the inflation in dollarized economies is significantly lower than in non-dollarized countries, and they also highlight that highly financial dollarized economies also have a lower rate of economic growth comparing to non-dollarized ones.

Moreover, the paper conducted by Carranza et al. (2009), which he analyzes a panel data of a hundred-plus countries with differing degrees of dollarization by using 2SLS dynamic panel. They found that a country with high dollarization degree presents the higher inflation pass-through, which implies that large depreciation is likely to have negative impact on pass-through coefficient.

The recent study by Sadeghi et al. (2015) investigates the effect of exchange rate pass-through to the domestic inflation in selected Middle Eastern and North African countries by using Dynamic Panel GMM estimators. The empirical result reveals that the devaluation of the exchange rate has a positive significant impact on the domestic price, and this finding is consistent with the views that the pass-through coefficients are larger in highly dollarized economies.

With regarding to various studies above, the size of the pass-through in high degree of dollarization is also the main factor that influences on domestic inflation which allows policy makers to take into consideration regarding the inferences for the efficiency of independent monetary policy.

IV. Methodology

4.1. Model

In order to investigate the relationship of exchange rate pass-through in dollarized economies to domestic inflation and economic growth. This paper uses two equations and all of them are developed by following the economic ideas as well as the empirical evidences by Carranza et.al (2009). The first one is to examine the matters of exchange rate pass-through in high degree of dollarization to domestic inflation. The second equation is to test the effect of exchange rate pass-through in dollarized

economies on economic growth, where the two dynamic regression equations have been designed as follows:

Inflation Equation:

$$\Delta P_{it} = \beta_0 + \beta_1 \Delta P_{it-1} + \beta_2 \Delta ER_{it-1} + \beta_3 DO_{it-1} + \beta_4 (\Delta ER_{it-1} * DO_{it-1}) + \beta_5 OPEN_{it} + \beta_6 FS_{it} + \varepsilon_{it} \quad (1)$$

Economic Growth Equation:

$$\Delta GDP_{it} = \beta_0 + \beta_1 \Delta GDP_{it-1} + \beta_2 \Delta ER_{it-1} + \beta_3 DO_{it-1} + \beta_4 (\Delta ER_{it-1} * DO_{it-1}) + \beta_5 OPEN_{it} + \beta_6 FS_{it} + \varepsilon_{it} \quad (2)$$

where:

ΔP_{it} is the percentage of domestic price inflation of country *i* at time *t*;

ΔGDP_{it} is the growth rate (percentage) of real gross domestic product (real GDP) of country *i* at time *t*;

ΔER_{it-1} is the lagged percentage change of bilateral nominal exchange rate (local currency per dollars) as the measured of nominal depreciation rate of exchange rate;

ΔP_{it-1} is the lagged percentage of domestic inflation rate;

ΔGDP_{it-1} is the lagged growth rate of real gross domestic product;

DO_{it-1} is the lagged dollarization degree;

OPEN is the degree of trade openness (Total export and import to GDP);

FS is the level of fiscal balance (Total revenues minus expenditure to GDP); regarding to the data from selected countries, it reflects the fiscal deficit;

ε_{it} is the error term.

4.2. Data and Methodology

In order to explore how inflation and economic growth could be affected by the exchange rate pass-through in dollarized economies, the dynamic panel data with fixed effects estimation method is considered for this study. Moreover, the analysis has divided into two parts to ensure the validity of estimated model. First is the benchmark analysis by incorporating panel data for all countries. Second, robustness check analysis would be done by excluding a highly dollarized country (i.e. Cambodia).

Besides that, to prevent the reverse causality between dependent and independent variables, the lagged value of inflation, real GDP, exchange rate and dollarization are incorporated into the estimated dynamic panel model. Moreover, the interaction term

between currency depreciation and dollarization degree are included in both equations to capture to what extent inflation and economic growth influences by the exchange rate pass-though in dollarized economies subject to the interest of this paper.

Two more additional sets of exogenous variables are added into the regression model. In this regard, the degree of trade openness, where the ratio of total exports plus total imports to GDP, and another additional variable represents fiscal balance as measure of government deficit. According to the data set above for all selected countries, it reflects the fiscal deficit (total revenues minus total expenditure to GDP).

Moreover, in order to consider the impact of dollarization degree into the regression model. This paper is measured the degree of dollarization by following the dollarization literature that developed by Reinhart et al. (2003). The degree of dollarization is a composite index constructed as the weighted mean of three indicators--the sum of the ratio of foreign currency deposits to broad money, the ratio of domestic government debt in foreign currency to total government debt, and the ratio of total external debt to gross national product (GNP).

The data that use in this analysis is based on the 16 periods from 2000-2015 for the selected financial dollarized economies in Southeast Asia, both high and moderate degree of dollarization (Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam). All the data are obtained from many sources such as the foreign currency deposit data and broad money are from staff report, Article IV consultation; Real gross domestic product (GDP), bilateral nominal exchange rate, total government expenditure, total revenues, and inflation rate are from International Monetary Fund, International Financial Statistics and World Economic Outlook; The data to calculate the trade openness such as total export, total import and GDP is obtained from World Development Indicators. Moreover, all the data that is used to measure the degree of dollarization is also obtained from World Development indicators. However, some of data such as domestic government debt in terms of foreign currency is obtained form the related website of each country such as Ministry of Finance and Central Bank (See Appendix Table 3).

4.3. Descriptive Statistics and Correlation

The summarize statistic of all variables that uses in this empirical regression model has been done by using STATA software. The result is itemized as in Appendix Table 4. The mean value of inflation is 6.01 percent where is largely variation across countries. Moreover, other variable such as exchange rate, where the mean is about 8080 of the national currency per dollars, and the maximum is 21,697.6 of the National currency per dollars. The sample composes of five cross countries data, and the Vietnamese currency indicates the highest depreciation across countries sample whereas the mean value of degree of dollarization is about 9.1. Besides, the mean of trade openness is 96.38 percent and mean of fiscal balance is about negative 2.40 percent.

Likewise, the correlation for all variables has also done by using STATA software. The details are summarized in Appendix Table 5. It indicates that the Inflation and GDP variables are negatively and highly correlation at about 93 percent. Thus, to avoid the multi-collinearity problem and insignificant econometric result, the inflation equation is not included real GDP variable as an explanatory variable. For GDP equation also excludes inflation as its independent variable. Moreover, other variable such as DO is negative with fairly low correlation with inflation while ER, OPEN and FS are also low and positively correlated with inflation and nominal exchange rate. The correlation of ER and FS also has a negative and fairly low correlated with GDP. Noticeably, DO and OPEN is indicated the positively correlated with GDP.

V. Findings

5.1. Inflation Equation

In the Appendix Table 6 shows the regression results for two analyses: benchmark and robustness for the inflation equation. The benchmark regression shows that the coefficient of persistent inflation is insignificant with the fairly high coefficient than other exogenous variables, it estimates at about 0.19. Moreover, the pass-through coefficient of exchange rate depreciation and the coefficient of dollarization degree indicate the negative and insignificant correlated to domestic inflation. This means that there is no direct pass-though coefficient of exchange rate depreciation and dollarization degree to domestic inflation. This is partly due to the various heterogeneity determinants of the pass-through and distinct situation of dollarization across countries. However, the interaction term variable between currency deprecation and dollarization degree shows the significant and positive relationship to inflation. This emphasizes that the level of dollarization increases the exchange rate pass-through coefficient by 0.04 percent. Thus, one percent increase of dollarization degree results in pass-through coefficient increase by the same vein and influences on the domestic inflation increases by 0.04 percent. Moreover, the coefficient of trade openness degree is also significant and positively correlated with domestic inflation. If one percent increase of trade openness, domestic inflation will rise by 0.1 percent, and the fiscal deficit is also largely positive and has significant coefficient which implies that fiscal deficit contributes to higher inflation. The increase of fiscal deficit by one percent will results in the increase of 1.2 percent of domestic inflation.

Besides, the case of robustness analysis reveals similar results with the benchmark case. There is high coefficient of persistent inflation and significant correlation with domestic inflation, where one percent increase of previous inflation positively affects the domestic inflation in current year by 0.3 percent. Similarly, the level of dollarization increases the exchange rate pass-through coefficient. It shows the positive and significant impact to domestic inflation, where one percent increase of dollarization degree results in pass-through coefficient increase and then it influences on the increase of domestic inflation by 0.04 percent. However, the rest of other

variables such as trade openness and fiscal deficit show the positive and insignificant influence on domestic inflation.

5.2. Economic Growth Equation

In the Appendix Table 7 indicates the empirical results for the economic growth equation. The benchmark regression shows that there is a positive coefficient and significant correlation of persistent growth rate of real GDP to the current real GDP. Thus, the increase of the previous real GDP by one percent positively impacts economic growth in current year by 0.3 percent. In addition, the pass-through coefficient of exchange rate depreciation also has positive and insignificant correlation to real GDP. In the same vein, the coefficient of dollarization degree has a negative impact and insignificant relationship to real GDP. This emphasizes that there is no direct impact of exchange rate depreciation and dollarization degree to economic growth. However, it reveals the indirect impact via the coefficient of interaction term between currency depreciation and dollarization degree which it shows the negative and significant correlation to real GDP. The result suggests that the degree of dollarization increases the pass-through coefficient by 0.05 percent. Therefore, one percent increase of dollarization degree results in the increase of pass-through coefficient by 0.05 percent and influences on the decline of real GDP by 0.05 percent.

Trade openness has negative and significant correlation to real GDP. Hence, by increasing one percent in trade openness, the real GDP decreases by 0.08 percent. The result indicates that trade openness does not stimulate the economic growth in selected countries. This finding is consistent with Redding, S. (1999), which stated that developing countries have comparative advantage in low-technology sector but once they embrace trade openness, high technology and know-how skills are needed; however, if firms in these countries cannot adapt with new technology and reforms, they will encounter lower economic growth. Another finding claimed by Vlastou (2010) mentioned that trade openness has a negative effect on economic growth based on the data from 34 African countries from 1960 to 2003.

Fiscal deficit indicates a negative and significant relationship to real GDP in my study. As one percent increase of fiscal deficit, it negatively impacts real GDP by 1.02 percent. This finding is in line with Fatima et al. (2011) who studied fiscal deficit and economic growth in Pakistan's economy. The result in this paper reveals that fiscal deficit has negative effects on Pakistan economic growth due to poor tax collection, accumulating external borrowing, uncertainty of price stability, and the turmoil of politics.

The robustness analysis which excludes the Cambodia is conducted but it shows similar results. For instance, the persistence of previous year real GDP has a positive and significant to real GDP. Thus, one percent increase in previous year of real GDP results in the rise of the current year of real GDP by 0.3 percent. Moreover, the coefficient of interaction term variable between exchange rate depreciation and

dollarization index also indicates the negative and significant correlation to real GDP. Thus, one percent increase of dollarization degree will decline economic growth by 0.04 percent. Other variables such as trade openness and fiscal deficit also reveal the the same result as benchmark case.

VI. Conclusion

This research paper examines the effect of exchange rate pass-through in dollarized economies to domestic inflation and economic growth: evidence form five selected countries in Southeast Asia over the period of 2000-2015. The key findings emphasize that there is no direct impact of currency depreciation and dollarization degree variables to domestic inflation and economic growth. However, the empirical results indicate that there is indirect impact of the exchange rate pass-through in dollarized economies to domestic inflation and economic growth via the interaction term variable between exchange rate depreciation and dollarization degree, which reveals that the level of dollarization increases the exchange rate pass-through coefficient and it influences on both domestic inflation and economic growth. Hence, it means that the increase of dollarization level results in higher pass-through coefficient and influences on the domestic inflation increase. Conversely, the increase of dollarization degree also influences on higher pass-through coefficient, but it results in the decline of economic growth. The rest of the variables such as fiscal deficit and trade openness are significant and correlated to domestic inflation and economic growth. It reveals that the increase of fiscal deficit and trade openness are positively resulted in domestic inflation. On the other hand, the increase of fiscal deficit and trade openness are negatively influenced on real GDP.

The results from both regression models (inflation and economic growth equations) indicate that the level of dollarization increases the exchange rate pass-through by 0.04 to 0.05 percent per unit of dollarization based on index in Reinhart et al. (2003). It should be noted that the dollarization index in my empirical paper range from 0 to 18; this implies that highly financial dollarized economies for selected countries in this empirical paper could have pass-through coefficient estimates of 0.72 to 0.9 percent. It emphasizes that there is quite large pass-though coefficient in highly dollarized economies across five selected countries, which is consistent with the accepted view that there is the large pass-through coefficient in high dollarized economies.

VII. Limitation of the Paper

The weakness of this paper is that some of the explanatory variables such as persistence of previous inflation, currency depreciation, and dollarization index did not show any significant impact on inflation and economic growth. This is probably because the various heterogeneity determinants of the pass-through and distinct situation of dollarization across countries. Moreover, due to some data constraints, the accuracy of data to measure the degree of dollarization, and unavailability of the data

of import invoice by currency (dollars). Be noted that it would be more accurate to use import invoice by currency to capture the impact of exchange rate pass-through in dollarized economies to inflation through import price.

Moreover, there remain other factors that may influence inflation and economic growth but this paper did not take into consideration, including bad weather, policy rate, wage, investment and aggregate demand. Another problem is that fixed effects estimation may be inappropriate to study dynamic concept. Regarding the panel data set in this research, it has long time dimension (T=16) and short country dimension (N=5), which is not applicable to employ Generalized Method of Movement (GMM).

Therefore, the future study should overcome these limitations by taking into account of possible control variables and try to collect more country dimension data which is more appropriate to employ advanced method, namely GMM so as to study dynamic panel data concept.

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Appendix:

Table 1. Degree of Dollarization that is classified by total foreign currency to Broad Money from 2000-2015

Year	High Dollarization Degree		Moderate Dollarization Degree		
	Cambodia	Lao PDR	Indonesia	Philippines	Vietnam
2000	68	76	19	34	32
2001	70	75	18	32	32
2002	69	73	16	30	28
2003	69	64	15	31	24
2004	71	61	13	33	24
2005	71	58	15	31	23
2006	75	58	13	24	22
2007	81	54	13	19	19
2008	78	50	15	21	20
2009	79	46	14	21	20
2010	81	44	13	20	19
2011	81	44	12	18	17
2012	83	42	13	17	13
2013	82	42	15	14	13
2014	83	44	14	16	14
2015	83	44	14	16	11
Average	**77**	**55**	**15**	**24**	**21**

Source: Data from IMF staff report, Article IV consultation, and author's calculation

Table 2. Degree of dollarization that is classified by following the measure of dollarization developed by Reinhart et al. (2003)

Year	Cambodia	Indonesia	Lao PDR	Philippines	Vietnam
2000	13	12	18	9	7
2001	12	11	18	9	7
2002	12	9	17	9	7
2003	13	7	16	9	6
2004	12	7	16	8	6
2005	12	7	16	8	5
2006	11	5	16	6	5
2007	10	5	15	5	5
2008	10	4	15	5	5
2009	11	4	15	5	5
2010	11	6	14	4	6
2011	11	6	14	4	6
2012	13	6	13	4	5
2013	13	7	13	3	5
2014	13	6	13	4	5
2015	13	7	14	4	5

Source: Author's calculation bases on the Data from IMF staff report, Article IV consultation; World Development Indicators; Ministry of Finance and Central Bank of each country.

Table 3. Descriptive Variables

Variable	Data	Source
ΔP_{it}	Domestic price inflation of country *i* at time *t* in term of percentage.	From International Financial Statistics, International Monetary Fund (IMF).
ΔP_{it-1}	Lagged domestic inflation rate in term of percentage of country *i* at time *t.*	Data for calculation is from International Financial Statistics, IMF.
ΔGDP_{it}	Growth rate of real gross domestic product (real GDP) of country *i* at time *t* in term of percentage.	From International Financial Statistics, IMF.
ΔGDP_{it-1}	Lagged real gross domestic product.	Data for calculation is From International Financial Statistics, IMF.
ΔER_{it-1}	Lagged percentage change of bilateral nominal exchange rate in units of local currency per dollars as the measured of nominal depreciation rate of exchange rate.	Data for calculation is from International Financial Statistics, IMF.
DO_{it-1}	Lagged dollarization degree where the level of dollarization degree is measured by following the dollarization literature that developed by Reinhart et al. (2003), which is as a composite index constructed as the weighted mean of three indicators--*the sum of the ratio of foreign currency deposits to broad money, the ratio of domestic government debt in foreign currency to total government debt, and the ratio of total external debt to gross national product (GNP).*	- Data of foreign currency deposit and broad money are from IMF staff report, Article IV consultation. - Data of domestic government debt in terms of foreign currency is obtained form the related website of each country such as Ministry of Finance and Central Bank. - GNP is measured as GDP plus total net income from abroad, where the data for calculation is from World Development Indicators.
OPEN	The level of trade openness where the ratio of total exports plus total imports to GDP.	Data of export, import and GDP are from World Development Indicators.
FS	The level of fiscal balance (total revenues minus total expenditure to GDP), regarding to the data from selected countries, it reflects as the fiscal deficit.	Data of total revenues, expenditure and GDP are from World Economic Outlook, IMF.
ε_{it}	The error term.	

Table 4. Descriptive Statistics of Variables: 2000-2015

Variable	Observations	Mean	Std. Dev	Min	Max
P	N = 80 n = 5 T = 16	6.010938	4.654472	-1.77	25
GDP	N = 80 n = 5 T = 16	.429	5.148506	-18.31	9.59
ER	N = 80 n = 5 T = 16	8080.165	6089.694	42.23	21697.57
DO	N = 80 n = 5 T = 16	9.1	4.157044	3	18
OPEN	N = 80 n = 5 T = 16	96.38188	35.14952	41.94	178.77
FS	N = 80 n = 5 T = 16	-2.403991	2.064889	-7.443988	.8631282

Source: Author's calculation by using STATA/SE software

Table 5. Correlation Matrix of Variables: 2000-2015

	P	GDP	ER	DO	OPEN	FS
P	1.0000					
GDP	-0.9322	1.0000				
ER	0.2853	-0.2365	1.0000			
DO	-0.0392	0.1498	-0.1439	1.0000		
OPEN	0.0647	0.0506	0.3540	-0.0311	1.0000	
FS	0.2760	-0.2293	-0.2647	-0.3582	-0.3393	1.0000

Source: Author's calculation by using STATA/SE software

Table 6. Summarizes Result of Inflation Regression Model

$$\Delta P_{it} = \beta_0 + \beta_1 \Delta P_{it-1} + \beta_2 \Delta ER_{it-1} + \beta_3 DO_{it-1} + \beta_4 (\Delta ER_{it-1} * DO_{it-1}) + \beta_5 OPEN_{it} + \beta_6 FS_{it} + \varepsilon_{it} \quad (1)$$

ΔP_{it}	Expected sign	Benchmark (All selected Countries)		Robustness Analysis (Excludes Cambodia)	
		Coefficient	P-Value	Coefficient	P-Value
ΔP_{it-1}	+	.1856112	0.193 (.1188627)	.2966244	0.054** (.0964789)
ΔER_{it-1}	+	-.1692518	0.268 (.1317113)	-.1337166	0.401 (.1371439)
DO_{it-1}	+	-.1611189	0.665 (.345346)	.0886376	0.571 (.1396623)
$(\Delta ER_{it-1} * DO_{it-1})$	+	.0419239	0.021** (.0113854)	.0351907	0.031** (.0091941)
$OPEN_{it}$	+	.0956296	0.027** (.0280656)	.0803129	0.158 (.042909)
FS_{it}	+	1.211561	0.014*** (.2874337)	1.175755	0.120 (.5449795)

Note: ** is statistically significant at 5 percent level, *** is statistically significant at 1 percent level, and the robust standard error is in parenthesis.

Table 7. Summarizes Result of Economic Growth Regression Model

$$\Delta GDP_{it} = \beta_0 + \beta_1 \Delta GDP_{it-1} + \beta_2 \Delta ER_{it-1} + \beta_3 DO_{it-1} + \beta_4 (\Delta ER_{it-1} * DO_{it-1}) + \beta_5 OPEN_{it} + \beta_6 FS_{it} + \varepsilon_{it} \quad (2)$$

ΔGDP_{it}	Expected sign	Benchmark (All selected Countries)		Robustness Analysis (Excludes Cambodia)	
		Coefficient	P-Value	Coefficient	P-Value
ΔGDP_{it-1}	+	.3119624	0.009*** (.066583)	.3115498	0.088* (.1245809)
ΔER_{it-1}	+	.2133814	0.317 (.1867309)	.1981014	0.425 (.2151723)
DO_{it-1}	-	.0927505	0.810 (.360512)	-.1652927	0.477 (.2038414)
$(\Delta ER_{it-1} * DO_{it-1})$	-	-.0457526	0.036** (.0147737)	-.0419939	0.078* (.0159626)
$OPEN_{it}$	+	-.0782311	0.061* (.0302992)	-.0793044	0.201 (.0485381)
FS_{it}	-	-1.022045	0.048 ** (.36239)	-1	0.217 (.6413719)

Note: * is significant at 10 percent level, ** is statistically significant at 5 percent level, *** is statistically significant at 1 percent level, and the robust standard error is in parenthesis.