

## Exchange Rate Effect on Gross Domestic Product in the Five Founding Members of ASEAN

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### Abstract

This paper concerns with the effect of exchange rate on gross domestic product (GDP) in the five founding member countries of the Association of Southeast Asian Nations (ASEAN-5) namely, Indonesia, Malaysia, Thailand, Singapore and Philippines. From theoretical perspective, exchange rate depreciation is a sign of economic failure in developing countries. However national economic perspective shows its merit in the increasing size of output. In this paper analysis, a set of panel data is used in which the time period was from 1980 to 2014 for the exchange rate variable of each member country. For the variable of GDP, the time period was from 1981 to 2015. In the pooled ordinary least squares (OLS) estimation, the real exchange rate coefficient had a statistically significant effect on the GDP level in the five member countries. The results showed that exchange rate depreciation would cause an increase in the countries' level of GDP. The implication from this research is that exchange rate depreciation stimulates the countries to increase their output. Increase in output would fulfil the demands of local and foreign markets. The countries' exported goods are expected to increase because they are considered cheap by their developed trading partners.

**Keywords:** Exchange Rate, Gross Domestic Product, Asean-5, Pooled Ordinary Least Squares

### 1.0 Introduction

The Association of Southeast Asian Nations (ASEAN) was established with the signing of the ASEAN Declaration (Bangkok Declaration) in Bangkok, Thailand, on 8 August 1967 by the five founding member countries, namely Indonesia, Malaysia, Philippines, Singapore and Thailand. Later, Brunei Darussalam joined on 7 January 1984. ASEAN now consists of ten countries. Viet Nam joined the association in 1995, followed by Lao PDR and Myanmar in 1997 and Cambodia in 1999 (ASEAN, (accessed March 2017)). Since the formation of the ASEAN Economic Community (AEC) in 2015, the region's economic position on the global stage has been robust. ASEAN received US\$120 billion of foreign direct investment (FDI), which represented almost 16% of world FDI among developing countries in 2016 (ASEAN, 2017, p.10).

The five founding member countries ASEAN (ASEAN-5) are always interesting to be analysed. In the past four decades, the dominance of primary products in the ASEAN-5 countries on trade has diminished. The five countries have been able to increase their exports of manufactured and service relative to primary products. With abundance of labor and natural resources and economic activity based on human-capital intensive and semi-technology, the shift from the production of primary goods to manufactured goods has influenced the trade performance of ASEAN-5 countries. As open economies, international trade and foreign direct investments (FDIs) play a key role in ASEAN member countries to achieve its objective of high economic growth with high levels of investment and export growth. For the five countries, there was a more than fourfold increase in their combined nominal GDP from US\$526 billion in 2000 to US\$2.7 trillion 2015 (adapted from IMF, various issues). In the current World Bank information, Indonesia, Thailand and Philippines are classified into lower-middle-income economies. Malaysia is in the middle-higher income category. Singapore is the only one ASEAN member that has achieved a high-income country status (World Bank (accessed March 2017)).

In the account of external trade direction, it was noted that Philippines experienced trade deficit problem during 15 years from 2001 to 2015. The country had a US\$3.72 billion trade surplus in 2000. But later it began to have trade deficits of \$9.07 billion in 2001 and US\$20.72 billion in 2015. For Indonesia, it had a trade surplus of US\$25.4 billion in 2000. Its largest trade surplus was US\$39.73 billion in 2006. The country began to experience trade deficits of US\$1.66 billion in 2012, US\$4.08 billion in 2013 and US\$1.89 billion in 2014. However, its trade balance improved to a surplus of US\$7.7 billion in 2015. For Thailand, its largest trade deficit was US\$ 24.79 billion in 2013 but later declined to US\$2.8 billion in 2014. In 2015, its trade balance improved to a surplus of US\$9.08 billion. In the case of Malaysia, there was no trade deficit during the period 2000-2015. Its largest trade surplus was US\$42.62 billion in 2008 but it declined to US\$23.98 billion in 2015. For Singapore, its trade performance record was remarkable with large trade surpluses of US\$43.78 billion in 2014 and US\$54.48 billion in 2015. The overall performance of the ASEAN-5 countries in 2015 indicated its trade surplus of US\$74.52 billion (adapted from ADB, various issues).

### **1.1 Research Problem**

By 1980, Indonesia, Malaysia, Thailand and Philippines, had moved from the policy of pegging to the US dollar toward more flexible exchange rate regimes of basket-pegging or managed dirty float (Rana, 1998). From 1990, there was an evolution of exchange rate behavior of the ASEAN-5 countries with varying degrees of exchange flexibility (Klyuev and Dao, 2016; Park, 2002). Indonesia, Philippines and Thailand profess floating exchange rates, while Malaysia and Singapore manage the value of their currencies against undisclosed baskets. Exchange rate of Malaysian ringgit is monitored against an undisclosed trade-weighted basket of currencies. For Singapore, intervention in foreign exchange market is to maintain Singapore dollar within an undisclosed target band (MAS, 2001). All the authorities in the ASEAN-5 countries acknowledge that their intervention in the markets is to smooth excess volatility rather than to target a specific level of the exchange of the rate (Klyuev and Dao, 2016).

According to Goldstein (1999), heavily managed exchange rate regimes had contributed to the accumulation of vulnerabilities that resulted in the 1997-1998 Asian Financial Crisis. External competitiveness would be reduced by over-valued exchange rates, which hampers

exports performance and growth, investment, consumption and job creation (Brixiova, Égert and Essid, 2013). In turn, the performance of gross domestic product (GDP) of a country will be affected.

From the research problem, the issue about exchange rate effect on GDP can be raised. The financial crisis worried about the output growth and performance in the affected four ASEAN countries: Indonesia, Malaysia, Philippines and Thailand. In theory, Bernanke, Olekals and Frank (2008) considered exchange rate depreciation as a sign of economic failure. In the long-term, it is thought not to help facilitate economic growth, vice versa. However in a national perspective, it is seen positively to increase size of output in a country. As argued by Eichengreen (2008), a more depreciated real exchange rate together with weak exchange rate volatility favors growth process. In relation to the issue, the questions addressed in the present research are: Does exchange rate significantly affect GDP in the ASEAN-5 countries? Does exchange rate significantly affect GDP in the four developing ASEAN countries after the achievement of Singapore as a developed country? The main objective of this study is to analyze the effect of exchange rate on GDP in the ASEAN-5 countries. The specific objectives are: 1. to examine the significance of exchange rate effect on GDP in the ASEAN-5 countries, 2. to examine the significance of exchange rate effect on GDP in the four developing ASEAN countries after Singapore has achieved a developed country status. The next section presents a literature review. It is followed by research methodology, results and finally, implication and conclusion.

## **2.0 Literature Review**

Theoretically, there have been arguments that some benefits can be generated from exchange rate depreciation or appreciation. There are two views when determining the desirability of exchange rate depreciation or appreciation for economic growth. The first view argues that exchange rate depreciation is useful in coping positive effects on real output, which is expansionary view of depreciation. The second view regards depreciation as an issue that leads to contractionary effects, which bring along harmful effects.

According to Habib, Mileva and Stracca (2016), real exchange rate does matter for growth in developing economies, but substantially less so in advanced ones. Berg and Miao (2010) also noted the positive effect of currency undervaluation on growth, particularly in developing countries. In Rodrik (2008), management of real exchange rate is central for economic growth and tested that undervaluation of the currency (a high real exchange rate) stimulates economic growth for developing countries because it generates economic activity toward higher productivity and employment growth. Assuming that manufacturing sector is characterized by a higher productivity, Eichengreen (2008) argued that undervalued real exchange rate would support a shift to the manufacturing sector by driving up the prices of tradable goods, increasing the economy-wide productivity and growth can be positively influenced by real exchange rate depreciations. In Razin and Susan (1997), only very high overvaluations that appear to be associated with slower economic growth. While, moderate to high (but not very high) undervaluations appear to be associated with more rapid economic growth. In different paper, Devereux (1997) concerned with the persistent of deviations from the 'Law of One Price'.

On the other hand, the view that the real exchange rate undervaluation could endanger growth and contribute to the weakness of economy can be traced back to Balassa-Samuelson Theorem (Harris, 2001; Razin and Susan, 1997). The Balassa-Samuelson theory differs from the view that depreciation must be induced in order to promote growth. The theory predicts that there is positive correlation between economic growth and real exchange rate appreciation. In Bernanke, Olekals and Frank (2008, pp. 455-458 ), maintaining competitive level and avoiding movements of currency depreciation persistently in the long-term is very important for economic growth. The real exchange rate stability and competitiveness should be considered as a necessary condition for economic success.

Empirically, by putting the success of Indonesia and Chile in implementing exchange rate policies where undervaluation has taken place, Gala and Libanio (2010) argued that the Brazilian experience on currency overvaluation in the 1990s is one of the causes of de-industrialization, given the loss of competitiveness of domestic industries in the tradable sector. David and Guillermo (2005) examined the currency crisis effect on economic growth for 28 countries. The results indicated that the real exchange rate was highly correlated with the intensity of economic growth which dropped during the currency crisis periods. They found that there was a direct relation between the GDP and RER. In Christopoulos (2004), the currency devaluation– output growth relationship for eleven Asian countries was examined. Their results showed that, in the long run, five out of eleven countries experienced the negative impact of depreciation on output growth while for Indonesia, Myanmar and the Philippines, depreciation improved growth prospects. In a Canadian context, Harris (2001) on a panel data analysis concluded that undervalued currency can increase productivity in the short run and in the long run, through causality in the relationship between real exchange rate and productivity, undervaluation harms productivity gains. Productivity is important to increase output growth.

Other empirical studies are related to the significant effect of exchange rate on GDP in Nigeria (Momodu, 2015; Obansa et. al 2013; Azeez, Kolapo and Ajayi, 2012; Akpan, 2008). In a study by Hua (2011) in the case of China, the real appreciation has exerted negative effects on the economic growth, which are higher in coastal provinces than in inland ones. In a different study that conforms with the Balassa-Samuelson prediction, Ito, Isard and Symansky (1999) found that Japan, Korea, and Taiwan are the countries that have positive correlation between economic growth and real exchange rate appreciation. To a lesser extent, Hong Kong and Singapore also experienced strong real appreciation with growth.

### **3.0 Research Methodology**

For this study, panel data were used to analyze the exchange rate effect rate effect on national output. The time period was from 1980 to 2014 for the exchange rate variable of each member country of the ASEAN-5, namely Indonesia, Malaysia, Thailand, Singapore and Philippines. For the GDP variable across the countries, the time period was from 1981 to 2015. Data were mainly taken from the reports of International Monetary Fund (IMF) and Asian Development Bank.

Data on gross domestic product (GDP) and exchange rate (ER) were deflated by GDP deflator and consumer price index (CPI), respectively in the base year prices 2010=100. Their real values were obtained by

$$\text{Real value of GDP} = (\text{nominal GDP/GDP deflator}) \times 100 \quad (1)$$

$$\text{Real value of ER} = (\text{nominal ER} \times \text{USCPI/local CPI}) \times 100 \quad (2)$$

where USCPI is the United States CPI.

The economic model of GDP in relation to exchange rates is

$$\text{GDP} = f(\text{ER}) \quad (3)$$

GDP is the annual value of gross domestic product by country (in local currency) and ER is the annual value of exchange rate (end of period) by country.

Theoretically, the variable of ER is expected to have a positive relationship with the GDP variable. The higher the exchange rate, the higher the level of output.

The econometric model is as follows:

$$\ln \text{GDP}_{it} = \beta_0 + \beta_1 \ln \text{ER}_{it-1} + u_{it} \quad (4)$$

$$i=1, \dots, \dots, \text{ith country}, t=1981, \dots, \dots, 2015$$

where  $\beta_0$  is the intercept and  $\beta_1$  is the slope coefficient that measures the elasticity of GDP with respect to the ER variable, at the cross-sectional unit  $i$  and time period  $t$ .  $\ln$  denotes the natural logarithm. The term  $u$  is stochastic disturbance assumed to be independently and normally distributed with zero mean and constant variance. The lagged one period of ER is to indicate that there is a lag between the available point of a country's level of GDP and the point at which the ER begins to affect. The proposed econometric model is in a log-linear form because of better results of expected sign of the ER variable than the linear model. In addition, the log-linear model may reduce the severity of heteroscedasticity.

In this analysis, a pooled OLS regression model with panel-corrected standard errors (PSCE) was used for estimation. Coefficients are assumed common across the cross-section units. As discussed by Greene (2000, p. 594), the OLS standard errors will be inconsistent with existing cross-section heteroscedasticity. Therefore, the standard errors for cross-section heteroscedasticity and contemporaneous correlation were corrected. Then the time series observations for all the cross-section units were pooled and the regression coefficients were estimated by OLS.

#### 4.0 Results

Using the pooled OLS regression model with panel-corrected standard errors (PSCE), the estimation results of elasticities were displayed in the four tables below. Table 1 and Table 3 show the results of the model without PCSE. In all the tables (Table 1 to Table 4), the estimated coefficients, the exchange rate are statistically significant to explain the level of output (GDP).

Table 1:

*Estimates of exchange rate elasticities of gross domestic product in ASEAN-5, 1981-2015 (Pooled OLS)*

Variable	Estimated coefficient	Standard error	t-ratio	p-value
Exchange rate (ER)	1.1419*	0.0132	86.46	0.000
Constant	25.332	0.0627	403.9	0.000

Note: R-square = 0.9771. F (from mean) = 7475.351 (p-value = 0.000).

Number of observations = 175. \* Significant at the 1 per cent level.

Table 2:

*Estimates of exchange rate elasticities of gross domestic product in ASEAN-5, 1981-2015 (Pooled OLS with PCSE)*

Variable	Estimated coefficient	Standard error	t-ratio	p-value
Exchange rate (ER)	1.1419*	0.0081	141.5	0.000
Constant	25.332	0.0962	263.4	0.000

Note: R-square = 0.9771. F (from mean) = 7389.918 (p-value = 0.000).

Number of observations = 175. \* Significant at the 1 per cent level.

Table 3:

*Estimates of exchange rate elasticities of gross domestic product in ASEAN-4, 1981-2015 (without Singapore) (Pooled OLS)*

Variable	Estimated coefficient	Standard error	t-ratio	p-value
Exchange rate (ER)	1.1402*	0.0143	79.66	0.000
Constant	25.345	0.0760	333.7	0.000

Note: R-square = 0.9784. F (from mean) = 6345.485 (p-value = 0.000).

Number of observations = 140. \* Significant at the 1 per cent level.

Table 4:

*Estimates of exchange rate elasticities of gross domestic product in ASEAN-4, 1981-2015 (without Singapore) (Pooled OLS with PCSE)*

Variable	Estimated coefficient	Standard error	t-ratio	p-value
Exchange rate (ER)	1.1402*	0.0063	181.2	0.000
Constant	25.345	0.0807	314.0	0.000

Note: R-square = 0.9784. F (from mean) = 6254.835 (p-value = 0.000).

Number of observations = 140. \* Significant at the 1 per cent level.

The positive sign of the exchange rate variable implies that the level of output increases when exchange rate increases. Exchange rate depreciation affects GDP positively. In the four tables, the exchange rate variable's estimated coefficients are statistically significant at the one percent level with 1.1419 (in Table 1 and Table 2) and 1.1402 (in Table 3 and Table 4), suggesting that the national output in the countries is sensitive to the value of exchange rate.

All the tables show that the R-square values of the GDP model are 0.98 indicates that the exchange rate variable can jointly explain the variation in the GDP level about 98 percent. The percentage levels of are acceptable for the one-explanatory models. In the overall test of 5 percent level of significance, the calculated p-value of the F-statistic is close to zero for all the tables, suggesting that all the models are significant.

With the exclusion of Singapore after achieving a developed country status, the exchange rate variable's estimated coefficients has decreased a little, from 1.1419 to 1.1402. Comparing the two types of GDP model, before and after standard errors correction, the size of standard errors for the ER estimated coefficients have been successfully reduced, from 0.013 (Table 1) to 0.008 (Table 2) for the ASEAN-5 and 0.014 (Table 3) to 0.006 (Table 4) for the ASEAN without Singapore.

### **5.0 Implication and Conclusion**

The estimation results indicate that developing countries would be better to have exchange rate depreciation in order to increase their levels of national output. The four ASEAN countries have experienced the financial crisis in 1997-1998 but it did not mean that their depreciated exchange rates during the period would cause their national output to decrease continuously. It was a matter of sudden happening that the developing countries had not really been aware of other economic strategies, particularly productivity and technology that could sustain their economic activities. As developing and open economies, exports contribution share is very important for developing countries to increase their gross domestic product. Hence this research gives an important implication that exchange rate depreciation, would provide an opportunity for the ASEAN member countries to increase their exports to many other developing countries, not only to developed countries. Cheap exported goods can stimulate the countries to increase their output in economy. Increase in output is not only to fulfill the demand for foreign market but local market too. As stated by Basevi (1977), after exchange rate depreciation, the depreciating country should provide an automatic check to vicious circle.

To conclude, the positive effect of exchange rate should be a stimulator for the ASEAN-5 countries to increase their national output. However, the movement of the exchange rate values still need to be monitored but in a soft management. It is to ensure that there will be no prolonged and excessive depreciation that will cause loss of confidence for other countries to invest in the four ASEAN developing countries.

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