# CHAPTER IV

# RESEARCH FINDINGS

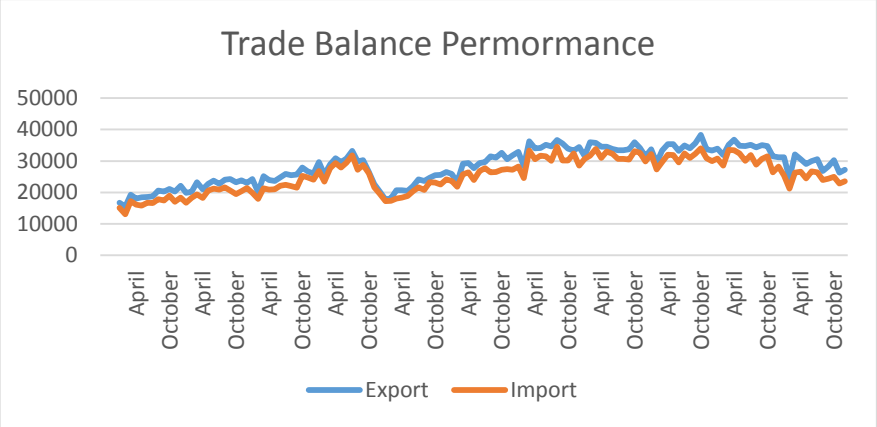
## 4.1 Researched Variables Overview

This sub-chapter will introduce the variables used in this research. This research has three variables from five countries which are; Export (EXPT), Import (IMPT), and nominal exchange rate of the countries (EXR). Total varibles used in this research are fiveteen variables which taken monthly from year 2005 to 2015. The data of the countries will be processed one by one, and then compared between countries to see how strong the economics of the selected ASEAN-5 countries are.

### 4.1.1 Country's Trade Balance Overview

The data shows the movement of exports and imports from ASEAN-5 countries are fluctuated. Trade balance experienced a recession in 2008 caused by the sub-prime mortgages that occurred in the US, resulting the currency shocks that ultimately affect the trade balance. After 2008, the trade balance stably improved. The following table fluctuations in exports and imports of the five Asian countries.

**Figure 4.1 Singapore's trade balance**




Singapore has the highest trade value among the sample countries. That is because Singapore does not have natural resources as a commodity which can be traded, resulting Singapore heavily relies on commodities produced by other countries through trade to meet the needs of their country. Can be seen in the chart above that the movement of exports and imports from countries Singapore tend to be stable and increasing. Gap generated by both variables are also not too big. This is because Singapore produce the exported commodities by importing raw materials from abroad

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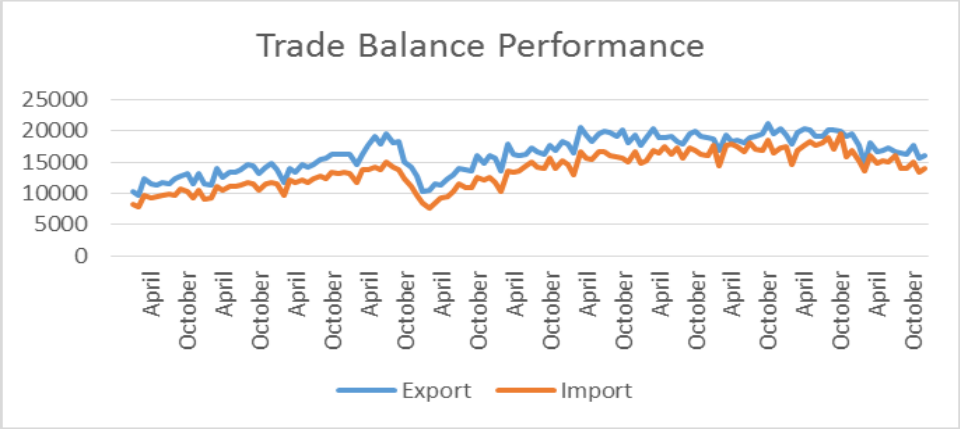
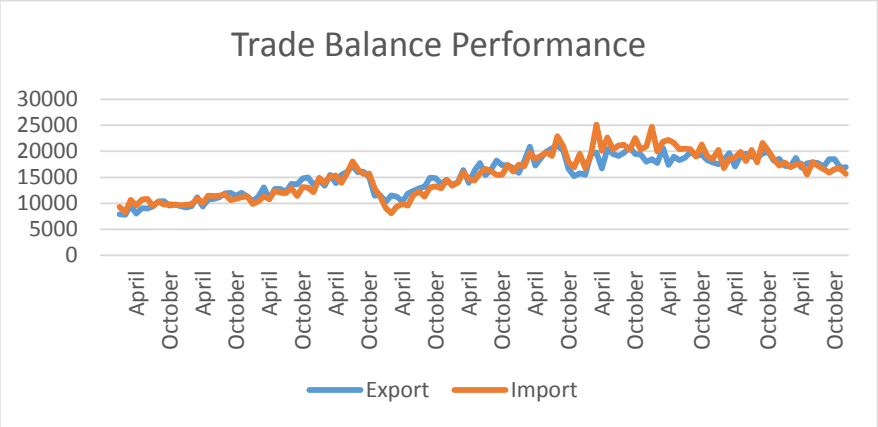
**Figure 4.2 Malaysia's trade balance**




Malaysia is a country blessed with natural resources such as agriculture, forestry, and mining. In the agricultural sector, Malaysia is one of the largest exporter of natural rubber and palm oil, which together with sawn logs and sawn timber, cocoa, pepper, pineapple and tobacco dominate the growth of the sector. Palm oil is also a major generator of Malaysia's international trade. Tin and petroleum are the two main mineral resources are becoming major economic backer Malaysia. Malaysia was once the largest tin producer in the world until the collapse of the tin market in the beginning of the 1980s. In the 19th century and 20th century, tin played a predominant role in the Malaysian economy. In 1972 the petroleum and natural gas took over from tin as the mainstay of the mineral extraction sector. Meanwhile, the contribution by tin has declined. The discovery of petroleum and natural gas in oil fields off Sabah, Sarawak and Terengganu have contributed much to the Malaysian economy. Other minerals of some importance or significance include copper, bauxite, iron, and coal together with industrial minerals such as clay, kaolin, silica, limestone, barite, phosphates and

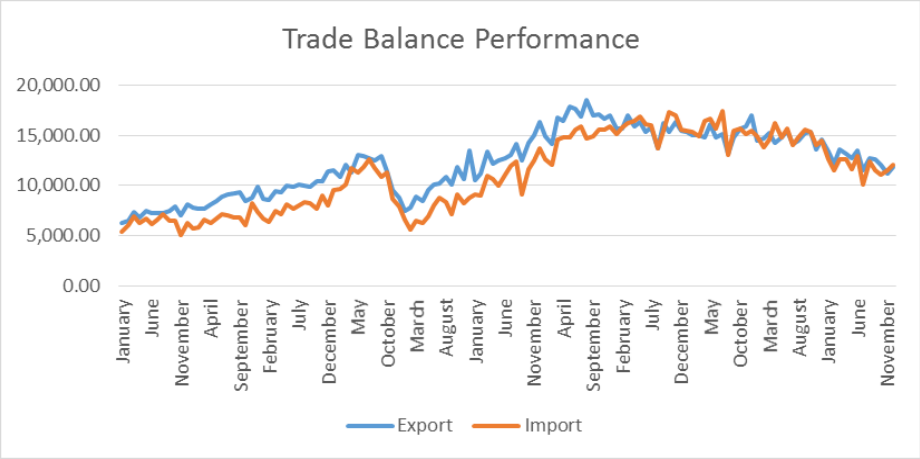
dimension stones such as granite as well as marble blocks and slabs. (http://www.tradingeconomics.com/malaysia/balance-of-trade)

**Figure 4.3 Thailand trade balance**




As an export oriented country, Thailand is highly exposed to external economic shocks, which lower demand for Thailand products, thus affecting the trade balance. Thailand major exports are electronics, vehicles, machinery and equipment. The country mainly imports fuel, electronic and machinery appliances. Main trading partner are Japan (10 percent of total exports and 20 percent of total imports) and China (12 percent of total exports and 15 percent of total imports). Others include: the European Union, the United States and Malaysia. (http://www.tradingeconomics.com/thailand/balance-of-trade)

**Figure 4.4 Indonesia's trade balance**



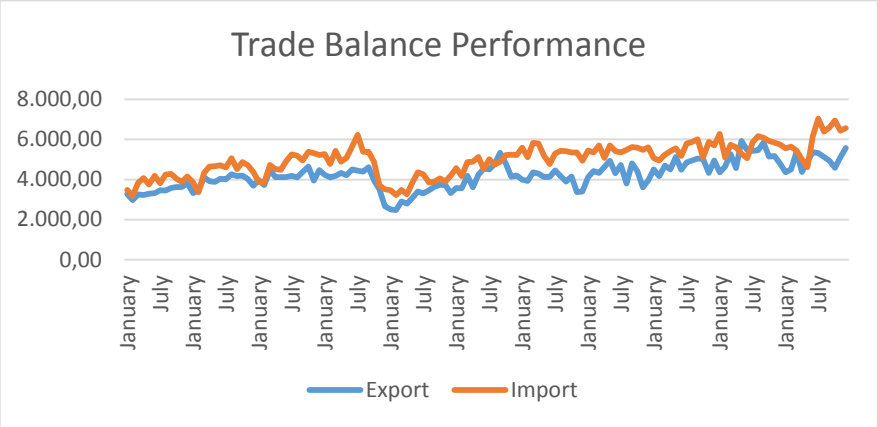

Since the 2000's Indonesia has been recording consistent trade surpluses due to robust exports growth. However, from due to the shock on 2008, the value of export and import falling as the other countries does, yet the countries sustain the economic turmoil. In 2012 to 2014 the country started recording trade deficits, as exports shrank due to slowdown in the global economy and fall in commodity prices. In 2015, trade balance swing again to surplus due to almost 20 percent fall in imports. In recent years, the biggest trade deficits were recorded with China, Thailand, Japan, Germany and South Korea. Indonesia records trade surpluses mainly with India, United States, and Malaysia.

(http://www.tradingeconomics.com/indonesia/balance-of-trade).

According to (Imamudin Yuliadi, 2008) in his paper, found that Indonesia is still counting on re-export products, in other words importing a middle raw material for exports prudctions. The results also imply about the pattern of trade conducted by the Indonesian entrepreneurs that they conducting a transactions with other states based on job orders by utilizing a cheap labor to seize a share of

international market. This situation illustrates that with the higher import content for export products will reducing a value-added export products nationwide.

**Figure 4.5 Philippine trade balance**




Philippine has suffer the trade deficits over a years. Philippine has been running annual trade deficits due to high imports of raw materials and intermediate goods. The trade balance should worsen due to the rapid rise in imports stimulated both by household consumption and the input needs for industry. Recent data showed export fluctuated extreamly after the shock held in 2008. The weak level of the currency has done little to boost exports, which should appear more affordable to foreigners, raising concerns about underlying global demand. (https://psa.gov.ph/business/foreign-trade)

From the trade balance overview of ASEAN-5 countries, all of those countries showing the same pattern of exports and imports performance. From 2005 until 2007 the trade balance movements showing an increasing value of exports imports, then fall in 2008 and 2009. This pattern caused by the external shocks came from United State economic caused by sub-prime morgate.

## 4.2 Research Findings and Discussion

This research use the econometical approaches to analyze the trade balance performance of ASEAN-5 countries and the interraction towards exchange rate fluctuation. In order to get the best result, we follow the standard procedure of time series analyses by following these procedures:

1. Unit Root Test – Augmented Dickey Fuller and Phillips-Perron Test
2. Correlation Matrix – Johansen-Juselius Cointegration Test
3. Vector Auto Regression-based analysis (VAR/VECM)
4. Impulse Response Function
5. Variance Decomposition Test

### 4.1.1 Unit Root Test

In the econometric examination model used is VAR/VECM model, the first test performed is stationary test to build the proper econometrics model. The unit root test is conducted by observing the value of Akaikie Information Criterion (AIC) and Schwarz Criterion (SC) through Augmented-Dickey-Fuller Test (ADF test) at level and at first difference level. If the t-statistics is value bigger than the critical value, the data is stationary at level and can be analyzed using VAR methods. But, if the t-statistics value is smaller than the critical value, then the data is not stationary at level. ADF-test is used to examine the stationary data and lag length of all variables in this research in level and first difference. From the

data processing program using Eviews 7 program, unit root test results are shown in the table below.

**Table 4.1**
**Unit Root Test - Augmented Dickey Fuller (ADF-test)**

| Test | ADF Test | | | | | |
|---|---|---|---|---|---|---|
| **Countries** | **Level** | **Prob** | **Note** | **1st Different** | **Prob** | **Note** |
| | **t-stat** | | | **t-stat** | | |
| **Singapore** | | | | | | |
| EXPT | -2.17 | 0.21 | Not Stationary | -6.27 | 0.00 | Stationary |
| IMPT | -2.16 | 0.2 | Not Stationary | -6.24 | 0.00 | Stationary |
| EXR | -1.78 | 0.38 | Not Stationary | -7.97 | 0.00 | Stationary |
| **Malaysia** | | | | | | |
| EXPT | -2.56 | 0.10 | Not Stationary | -17.01 | 0.00 | Stationary |
| IMPT | -2.26 | 0.18 | Not Stationary | -19.16 | 0.00 | Stationary |
| EXR | -1.08 | 0.71 | Not Stationary | -3.18 | 0.02 | Stationary |
| **Thailand** | | | | | | |
| EXPT | -2.30 | 0.17 | Not Stationary | -16.43 | 0.00 | Stationary |
| IMPT | -1.94 | 0.30 | Not Stationary | -11.78 | 0.00 | Stationary |
| EXR | -1.94 | 0.30 | Not Stationary | -8.34 | 0.00 | Stationary |
| **Indonesia** | | | | | | |
| EXPT | -1.94 | 0.30 | Not Stationary | -18.34 | 0.00 | Stationary |
| IMPT | -1.65 | 0.45 | Not Stationary | -16.50 | 0.00 | Stationary |
| EXR | -0.78 | 0.81 | Not Stationary | -9.20 | 0.00 | Stationary |
| **Philippine** | | | | | | |
| EXPT | -2.47 | 0.12 | Not Stationary | -16.73 | 0.00 | Stationary |
| IMPT | -3.16 | 0.02 | Not Stationary | -14.57 | 0.00 | Stationary |
| EXR | -2.22 | 0.19 | Not Stationary | -7.57 | 0.00 | Stationary |

Table 4.1 suggest that all variables, exchange rates and trade balance of five countries are not stationary in the level. Therefore, the variables should be transformed into first different, and seemingly all of variables are stationary at first different. The defined equation of the variables are presented below;

$$DEXR_t = A_0 + A_1 EXPT_{t-2} + A_2 IMPT_{t-2} + e_t$$

In which D is represented as first difference. $DEXR_t$is represented as first different of variable exchange rate. $A_1 EXPT_{t-2}$ is represented as variable export

in first different. $A_2 IMPT_{t-2}$ is represented as first different of variable import. As the all variables are in the first different, the relationship among the variables exchange rate, export, and import should be conducted in VECM estimation on their first different.

Before we go through the next step of analysis, VECM estimation procedure need to be tested into leg length criteria. Leg length estimation is conducted to decrease the probability of autocorrelation problem in VAR stability analysis. VECM estimation presuppose the data is in stationary condition. As the data is seemingly stationary in first different, hopefully can increase the validity of model output. So, hopefully this research has a high validity conclusion.

Lag length test result in VAR by entering Akaike Information Criterion (AIC) showing the optimal lag length of each countries are;

**Table 4.2**
**Optimal Lag Length Criteria**

| Countries | Optimal Lag Length |
|---|---|
| Singapore | 2 |
| Malaysia | 2 |
| Thailand | 2 |
| Indonesia | 2 |
| Philippine | 1 |

The test result of VAR estimation will resulting variance decomposition and impulse response function that will used to answer the research problems.

### 4.1.2 Correlation Matrix – Johansen Juselius Cointegration Test

Cointegration test is very crucial in this research. In order to examine which method is used in the next step estimation, this cointegration test is needed to be conducted. Cointegration test is conducted to see the stationarity of variables. The integrating variables define similar stochastic trend and long-term similar movement.Cointegration test examined by the Johansen Juselius Cointegration test. In order to find out the number of cointegrating vectors, Trace statistic and Maximal Eigen value tests were used. This research examined all of five countries, in which the result would be different from each countries. The null hypothesis of no integration is rejected at the 0.05 significance. Findings will be shown in table below;

**Table 4.3**
**Cointegration Test**

| H 0 | Trace Test | | | | |
|---|---|---|---|---|---|
| | Singapore | Malaysia | Thailand | Indonesia | Philippine |
| r = 0 | 153.49** | 78.85** | 146.72** | 146.26** | 213.07** |
| r < 1 | 76.66** | 37.42** | 58.38** | 78.63** | 114.30** |
| r < 2 | 24.61** | 8.48** | 25.96** | 29.50** | 43.90** |
| | Maximum Eigenvalue Test | | | | |
| r = 0 | 76.82** | 41.42** | 88.34** | 67.63** | 98.76** |
| r < 1 | 52.04** | 28.94** | 32.42** | 49.12** | 70.39** |
| r < 2 | 24.61** | 8.48** | 25.96** | 29.50** | 43.90** |

Note: ** denotes significant at 5%

The table 4.3 shows the result of johansen – juselius co-integration test consist of the trace test and maximum eigenvalue test. Every countries has their own lag for their estimation. These value are represent the long-term elasticity measures.

According to above co-integration test, the trace test and maximum eigenvalue test showed there is a co-integration of all variables at $\alpha = 5\%$ in each countries. In other words, the export and import in each countries are co-integrated having tested by Johansen-juselius test. Therefore, all countries suggest that they are not in violation of their international budget constraints and trade imbalances are only a short-term phenomenon that in the long run are sustainable. Even Philippine who has deficits trade balance among the others has a significant result according to the test. In term of trade policy, seemingly all of the sample countries are showing a "good policy" in managing their trade balance stability and moving away from external shocks or the existence of a productivity gap.

The next cointegration test can be seen from VECM estimation. The coefficient (cointEq1) showed the speed of adjustment of disequilibrium in the period of study. In this case, the trade balance variables influence the exchange rate. this test is conducted to choose the method we use in this research. It is VAR or VECM analysis.

**Table 4.4**
**Cointegration Test 2**

| **CointEq1** | Singapore | Malaysia | Thailand | Indonesia | Philippine |
|---|---|---|---|---|---|
| EXR | [0.37156] | [ 0.99421] | [-1.87085] | [-2.42189]* | [-0.20284] |
| EXPT | [-3.16701]* | [-3.71215]* | [-3.99557]* | [ 1.30068] | [ 1.52899] |
| IMPT | [-3.08932]* | [-1.27068] | [-0.28396] | [ 2.81287]* | [-3.99883]* |

Note: [] t-stat, *significant

Table 4.4 showed the coefficient (CointEq1) of VECM estimation. According to the result, Indonesia is the only one country who is significant of their exchange rate variable which is act as exogenous variable. This mean that Indonesia trade balance variables are corrected by Error Correction Term (ECT)

in the short term so can significantly explain the exchange rate in long term condition. Because of the significant result, Indonesia using VECM method. The other four countries are unsignificant of their coefficient, therefore VAR method is used.

The Granger causality test is also conducted in order to know the possibility of casual relationship resulting from co-integrating between or among variables. The research variables could either in exogenous or endogenous form. Bivariate Causality Analysis used in this research is Pairwise Granger Causality Test. From the results, causality relationship happens when the probability value is less than alpha 0,05. The findings are shown below;

**Table 4.5**
**Granger Causality Test**

| **Singapore** | | | **Malaysia** | | |
|---|---|---|---|---|---|
| Exchange Rate (EXR) | | Export (EXPT) | Exchange Rate (EXR) | | Export (EXPT) |
| (7.70) | ==> | (1.50) | (2.27) | <== | (2.76555) |
| [0.0007] | | [0.2259] | [0.0649] | | [0.0306] |
| Exchange Rate (EXR) | | Import (IMPT) | Exchange Rate (EXR) | | Import (IMPT) |
| (9.73) | ==> | (0.42) | (3.03532) | <==> | (2.45101) |
| [0.0001] | | [0.6554] | [0.0201] | | [0.0498] |
| **Thailand** | | | **Philippine** | | |
| Exchange Rate (EXR) | | Export (EXPT) | Exchange Rate (EXR) | | Import (IMPT) |
| (6.40291) | ==> | (2.07392) | (6.91336) | ==> | (2.65351) |
| [0.0023] | | [0.1300] | [0.0096] | | [0.1058] |
| Import (IMPT) | | Export (EXPT) | Import (IMPT) | | Export (EXPT) |
| (6.07405) | <==> | (8.41171) | (8.17463) | <==> | (14.9824) |
| [0.0030] | | [0.0004] | [0.0050] | | [0.0002] |
| **Indonesia** | | | **Note;** | | |
| Export (EXPT) | | Import (IMPT) | F-statistic in () | | |
| (0.57990) | <== | (5.65933) | Probability in [ ] | | |
| [0.5615] | | [0.0044] | | | |

Table 4.5 shows the result of granger causality test. According to the result of granger causality test, those five countries have a different result depent on their economic condition. In regard to above findings, some assumption are explained below:

- Singapore has a very significant result on their exchange rate variable which has influence both their export and import variables. Otherwise, none of their trade balance variables are influence the exchange rate. It is because the Singapore's monetary policy has choose the manage floating

exchange rate system which has a limited border line for exchange rate to fluctuate. The government of Singapore need to carefully manage their exchange rate volatility, because Singapore is the small and open economy country. Means that, the exchange rate is the most effective policy intrument for maintaining their domestic price stable. (Monetary Authority of Singapore, 2011)

- Malaysia otherwise, has let their trade balance variables influence their exchange rate, with only 0.03 and 0.04 significant level. Thus, their exchange rate variable only effect import. As a free floating exchange rate system user, Malaysian exchange rate is determined by supply and demand for the currency without government interventions, while the supply and demand for it is currency are determined by trading.

  Accroding to Jarita Duasa (2009), on her paper found that the degree of Exchange Rate Pass-Through (ERPT) on both exports and imports variables are low or incomplete. Then she suggest that the monetary policy is not very sensitive to exchange rate fluctuations. On the other hand, the use of exchange rate adjustment to improve the trade balance is less effective with the low ERPT.

- Thailand is the export-oriented country which adopt managed floating exchange rate regime, as same as Singapore. The finding above conclude that, Thailand’s exchange rate is influence the stability of export which in line with Thailand’s export-oriented policy by the government. As the export-oriented country, the appreciation of real exchange rate because of a

massive export caused a slowdown in Thailand's export. The real appreciation was due to the steady rise in the domestic price level relative to the price levels of major trading partners. The result also showing the bivariate causality between Thailand's trade balance variables. We assume that because of reduction of important raw input material made Thailand import it from neighbor countries, that is Japan who has the largest source of imported good for Thailand. Thailand has been dependent on imports of cheaper capital goods from Japan since then.

- The result of granger causality test for Indonesia is showed that only import that affect export of Indonesia's with 0.040 significant level. Iman (2005) state that the supply shifter is more important than the demand shifter in explaining Indonesia's export in the pre-crisis period has a broader consequence on modelling of export and on policy decisions. Thus, devaluation policy is not very effective. And he found that import is more sensitive to exchange rate, therefore the improvement of trade balance performance will be mainly come from import.
- Philippine result from granger causality test is that their exchange rate variable only affect the import. The findings are support the current economic condition of Philippine, that massive expenditures come from the household consumption and raw material needs of industrial company. With the massive imports of foreign goods, the fluctuation of currency may disrupt the imports variable because of changes in goods prices.In addition, the large spending may lead to the high demand for funds and tend to raise

up the nominal interest rate relative to inflation. The findings also show that their trade balance has a bivariate causality between eachother.

### 4.1.3 Vector Error Correction Model (VECM)

In order to catch the short-term and long-term dynamics model, Vector Error Correction Model is used. The cointegration test exemined to see the similarity stochastic trend and long-term similiar movement of the variables. According to the result of cointegration test, Indonesia has their variables co-integrated, therefore VEC model is used. The short-term VECM result will be interpratated in table below;

**Table 4.6**
**Short-term VECM Estimation**

| | **Indonesia** | |
|---|---|---|
| Variables | Coefficient | t-Statistic |
| CointEq1 | -0.012239 | -2.42189 |
| D(EXR(-1)) | 0.195410 | 2.2127 |
| D(EXR(-2)) | -0.194819 | -2.20655 |

Tables 4.6 shows the result of short-term estimation for Indonesia. in this estimation, the variable of exchange rate is become exogenous variable that affected by the trade balance. Those variables are significant at alpha 5%. The estimation result will be explain below;

a. Indonesia's exchange rate variable in the first and second lags significantly affect the EXR at the amount 0.195410 and -0.194819 at alpha 5%. Means that, if the variable exchange rate increased by 1% in the previous year, it will increses it is variable by 0.195410 in present year. However, if the variable EXPT increase by 1% in two years before it will decreases at the

amount 0.194819 in the present year. The variable cointEq1 which showed the speed of adjustments were significant with negative signs indicates that about 1.2% of disequilibrium is corrected each month to bring the long-term equilibrium between variables.

In the short-run VECM estimation above, the trade balance variables insignificantly affect the exchange rate variable. Indonesia's exchange rate variable are affected by its own variable. This findings explained that fiscal policy is more effective in keeping the exchange rate stable. The findings also prove the condition that in the short-term, government has a good policy in maintain their exchange rate fluctuation toward trade activities.

VEC Model also estimate the long-term dynamic movement of variables. VEC model estimation result will be shown below;

**Table 4.7 Long-term VECM Estimation**

| **Indonesia** | | |
|---|---|---|
| Variables | Coefficient | t-Statistic |
| EXPT(-1) | 7.895563 | 3.60424 |
| IMPT(-1) | -7.28879 | -3.85874 |
| C | -31112.02 | |

In the tabel 4.7 above showing the long-term analysis. The findings of Indonesia long-term analysis will be explained below.

1. Indonesia's estimation result showed that variable exports have a positively significant effect the exchange rate variable, while imports have negatively significant effect on exchange rate. The positively significant of exports variable means that if there is an increasing on exports, it will increase the exchange rate at the amount 7.895563%. Otherwise, the

negatively significant effect of imports means that, if there is an increasing on imports it will decrease the exchange rate variable at the amount 7.288793%.

Indonesia's nominal exchange rate has significantly affected by trade balance in long-term estimation. In the previous description of countries trade balance performance, Indonesia having a surplus in their trade balance, in other words their exports are greater than imports. They could sell the product with a higher net income rather than it is spending. In general, this means that Indonesia's economy are relatively stronger than its trading partners. As a result, their currencies tend to be strengthen againts its trading partner's countries. If Indonesia experienced a surplus trade balance continously, in the long-term it will makes the exchange rate tend to be strengthen.

### 4.1.4 Vector Autoregression (VAR)

VAR model is a model that estimate the variables with quadratic model estimation. In VAR model, the variables will be predicted by itself (lag), and also information from the movement of endegenous variables. The result of VAR estimation will be explained in coefficient form;

1. Singapore
   - Exchange Rate (EXR)

     D(EXR) = 0.36150945*D(EXR(-1)) - 0.066313050*D(EXR(-2)) + 0.070765855*D(EXR(-3)) - 3.23897540436e-06*D(EXPT(-1)) - 5.3379204e-07*D(EXPT(-2)) + 1.7660686e-06*D(EXPT(-3)) +

2.3925695e-06*D(IMPT(-1)) + 1.1615035e-06*D(IMPT(-2)) - 2.019092e-06*D(IMPT(-3)) - 0.0012413539

From the above estimation, the endogenous variables can predict the movement of exchange rate 16.7% (R-squared). The value of coefficient in the first lag EXR and EXPT significantly influence the EXR. For IMPT unsignificantly influence EXR in all lags.

- Exports (EXPT)

  D(EXPT) = - 15257.154*D(EXR(-1)) - 16027.190*D(EXR(-2)) - 17761.637*D(EXR(-3)) - 0.63507956*D(EXPT(-1)) - 0.05499913*D(EXPT(-2)) + 0.18893342*D(EXPT(-3)) + 0.12406263*D(IMPT(-1)) - 0.21418097*D(IMPT(-2)) - 0.077379238*D(IMPT(-3)) + 29.539394

  From the above estimation, the endogenous variables can predict the movement of exports 32.7% (R-squared). The value of coefficient in the first lag EXPT significantly influence the EXPT, while for EXR and IMPT insignificantly influence EXPT in all lags.

- Imports (IMPT)

  D(IMPT) = - 19444.807*D(EXR(-1)) - 16154.018*D(EXR(-2)) - 20996.8777*D(EXR(-3)) + 0.20226895*D(EXPT(-1)) + 0.31173994*D(EXPT(-2)) + 0.36243626*D(EXPT(-3)) - 0.77613170*D(IMPT(-1)) - 0.57409585*D(IMPT(-2)) - 0.20004989*D(IMPT(-3)) - 19.219076

From the above estimation, the endogenous variables can predict the movement of imports 37.2% (R-squared). The value of coefficient in the first lag IMPT significantly influence the IMPT. In the second lag IMPT also significantly influence the IMPT. In the third lag EXR and IMPT significantly influence the IMPT.

2. Malaysia

- Exchange Rate (EXR)

  D(EXR) = 0.395325985*D(EXR(-1)) - 0.0408786909*D(EXR(-2)) - 7.11323528e-06*D(EXPT(-1)) - 3.97615183e-06*D(EXPT(-2)) + 2.84615893e-06*D(IMPT(-1)) + 5.87121240e-06*D(IMPT(-2)) + 0.00244025260355

  From the above estimation, the endogenous variables can predict the movement of exchange rate 16.5% (R-squared). The value of coefficient in the first lag EXR significantly influence the EXR. For EXPT and IMPT are insignificantly affect the EXR in all lags.

- Exports (EXPT)

  D(EXPT) = - 1757.53058*D(EXR(-1)) - 5266.05984*D(EXR(-2)) - 0.232398809*D(EXPT(-1)) + 0.0480774197*D(EXPT(-2)) - 0.337234691*D(IMPT(-1)) - 0.339417628*D(IMPT(-2)) + 94.1533942

  From the above estimation, the endogenous variables can predict the movement of EXPT 26% (R-squared). The value of

coefficient in the first lag IMPT has significantly influence the EXR. In the second lag EXR and IMPT has significantly influence the EXPT.

- Imports (IMPT)

  D(IMPT) = - 2207.81167*D(EXR(-1)) - 4809.42670*D(EXR(-2)) + 0.309090532*D(EXPT(-1)) + 0.199326193*D(EXPT(-2)) - 0.917047389*D(IMPT(-1)) - 0.469867024*D(IMPT(-2)) + 98.5044827

  From the above estimation, the endogenous variables can predict the movement of IMPT 36% (R-squared). The value of coefficient in the fist lag EXPT and IMPT has significantly influence the IMPT. In the second lag EXR and IMPT has significantly influence the IMPT.

3. Thailand

- Exchange Rate (EXR)

  D(EXR) = 0.334499512*D(EXR(-1)) - 0.0680759683*D(EXR(-2)) - 3.51613749e-05*D(EXPT(-1)) - 1.40927185e-05*D(EXPT(-2)) + 3.50174072e-05*D(IMPT(-1)) + 3.6929589e-05*D(IMPT(-2)) - 0.051434140

  From the above estimation, the endogenous variables can predict the movement of EXR 11% (R-squared). The value of coefficient in the first lag EXR significantly influence the EXR. For EXPT and IMPT are insignificantly affect the EXR in all lags.

- Exports (EXPT)

  D(EXPT) = 167.552739*D(EXR(-1)) + 148.560945*D(EXR(-2)) - 0.323333676*D(EXPT(-1)) - 0.223137794*D(EXPT(-2)) - 0.112781992*D(IMPT(-1)) + 0.138356215*D(IMPT(-2)) + 119.711029

  From the above estimation, the endogenous variables can predict the movement of EXPT 22.9% (R-squared). The value of coefficient in the first lag EXPT has significantly influence the EXPT. In the second lag EXPT also significantly influence the EXPT, while for EXR and IMPT insignificantly influence the EXPT in all lags.

- Imports (IMPT)

  D(IMPT) = - 88.1104695*D(EXR(-1)) - 29.0465940*D(EXR(-2)) + 0.38403845*D(EXPT(-1)) + 0.299762532*D(EXPT(-2)) - 0.722935162*D(IMPT(-1)) - 0.280108816*D(IMPT(-2)) + 42.0013262

  From the above estimation, the endogenous variables can predict the movement of IMPT 32.2% (R-squared). The value of coefficient in the first lag EXPT and IMPT are significantly influence IMPT. In the second lag EXPT and IMPT also significantly influence IMPT, while for EXR insignificantly influence IMPT.

4. Philippine

- Exchange Rate (EXR)

  D(EXR) = 0.441184723*D(EXR(-1)) - 0.148496511*D(EXR(-2)) - 2.77649267e-05*D(EXPT(-1)) - 0.000217774272*D(EXPT(-2)) + 0.000186988344*D(IMPT(-1)) + 0.00020513502*D(IMPT(-2)) - 0.0475908991

  From the above estimation, the endogenous variables can predict the movement of EXR 20% (R-squared). The value of coefficient in the first lag EXR significantly influence the EXR. For EXPT and IMPT are insignificantly affect the EXR in all lags.

- Exports (EXPT)

  D(EXPT) = 29.9351120*D(EXR(-1)) - 81.9121135*D(EXR(-2)) - 0.42022310*D(EXPT(-1)) - 0.153425581*D(EXPT(-2)) + 0.0166787653*D(IMPT(-1)) + 0.104139518*D(IMPT(-2)) + 19.1505377

  From the above estimation, the endogenous variables can predict the movement of EXPT 17.6% (R-squared). The value of coefficient in the first lag EXPT significantly influence the EXPT. The other endogenous variables are insignificantly affect the EXPT.

- Imports (IMPT)

  D(IMPT) = - 68.2834415*D(EXR(-1)) - 11.861354*D(EXR(-2)) + 0.180168489*D(EXPT(-1)) + 0.0186136789*D(EXPT(-2)) -

0.311504668*D(IMPT(-1)) - 0.120918927*D(IMPT(-2)) + 24.0903783

From the above estimation, the endogenous variables can predict the movement of IMPT 11.5% (R-squared). The value of coefficient in the first lag IMPT significantly influence the IMPT. The other endogenous variables are insignificantly affect the EXPT.

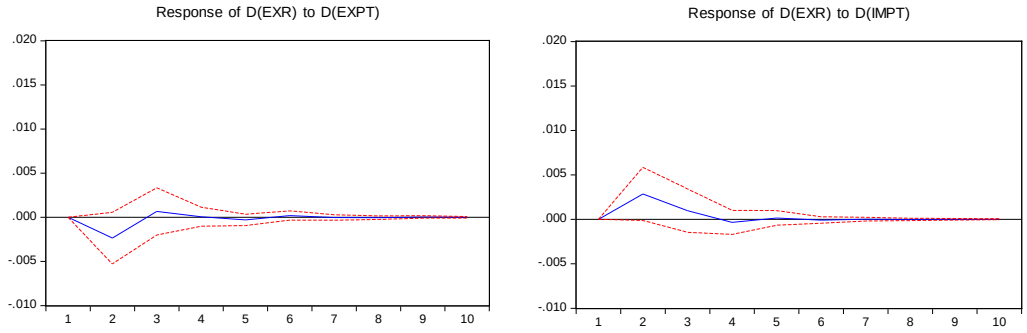
### 4.1.5 Impulse Response Function

The impulse response functions test is used to examine the response of one variable toward the other variables, either it is positive or negative, especially when one of variable get shock. In short-term analysis, the response are usually significant and fluctuated, while in the long-term analysis the movement of variables are usually get stable and consistance. The shock effect duration of Impulse Response Function result in one variable are depend on the point when the effect of shock disappears or returns to equilibrium can be seen and known. The persistance of a shock shows how durable and how quickly the system to get it back to equilibrium, Sims (1992). The result of the test will be interpretated below;

1. Singapore

Singapore test result of impulse response function to see the shock on exchange rate and its impact on trade balance can be seen below;

**Figure 4.6 Singapore IRF (graph)**

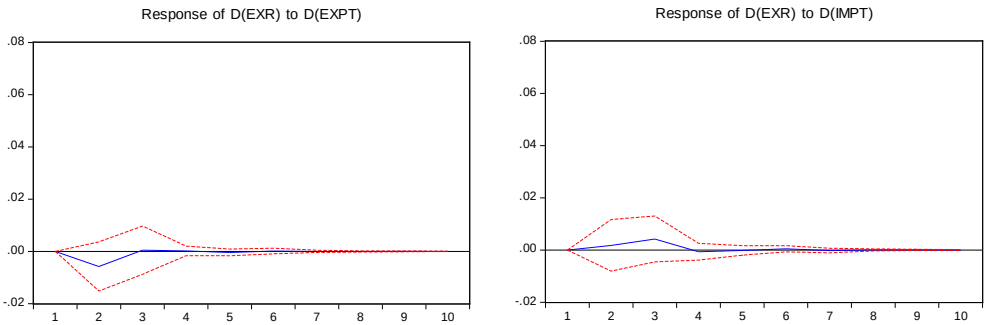



The result of IRF above showed that the fluctuation of variable export and import when exchange rate got shock has a low effect. We can see in the graphs that variable export got negative fluctuation in the first until fouth period, and then stable in rest of period. The import variable have a positive fluctuation toward exchange rate. In brief, Singapore country has a sustainable trade balance caused by the capability of exchange rate to absorb the shock and the role of government to manage their currency fluctuation since Singapore has adopted manage-floating-currency policy.

2. Malaysia

Malaysia'simpulse response function test result can be seen below;

**Figure 4.7 Malaysia IRF (graph)**

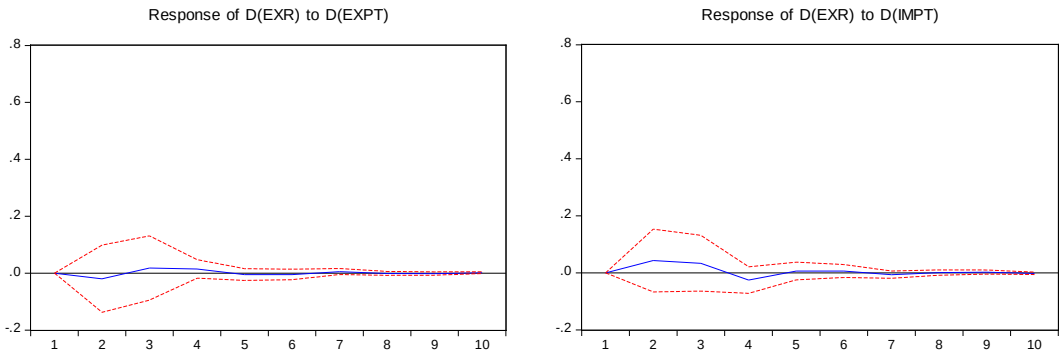


The findings shows the response of Malaysian trade balance, export (EXPT) and import (IMPT) on the shock of exchange rate (EXR). EXPT starts the response with negative trend in the first until third period. The response get stable with positive trend in the fourth period ahead. IMPT somehow, has positive trend overall in response to the EXR shock's. In the first until fourth period, the trend are moving with positive trend. In the fiveth period the trend is going to stable until tenth period.

3. Thailand

Thailand impulse response fuction test result can be seen below;

**Figure 4.8 Thailand IRF (graph)**




The finding above shows the response of Thailand trade balance, export (EXPT) and import IMPT toward the exchange rate (EXR) shock. The Thailand export starts the trend with negative response until third period. The response got positive trend in third period and fluctuate shoothly until seventh period. The trend got stable in the eighth period ahead. Import of Thailand starts with positive trend in response to the exchange rate shock until third period. In the fourth period the trend turn

to negative trend. Smooth movement of imports response starts in fiveth period ahead.

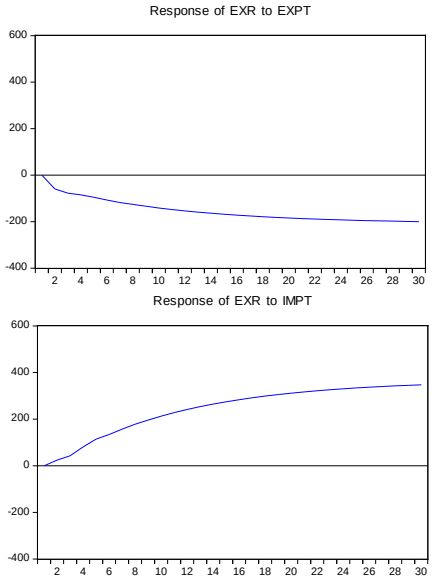
4. Indonesia

Indonesia's impulse response function will be shown in table and graph. The test result can be seen below;

**Table 4.8 Indonesia IRF (table)**

| Indonesia exchange rate IRF | | |
|---|---|---|
| Period | Export | Import |
| 1 | 0.000000 | 0.000000 |
| 3 | -77.23881 | 42.73013 |
| 6 | -106.8645 | 134.1069 |
| 9 | -133.8334 | 196.0935 |
| 12 | -153.6378 | 241.3071 |
| 15 | -168.1494 | 274.5516 |
| 18 | -178.8311 | 299.0219 |
| 21 | -186.701 | 317.0453 |
| 24 | -192.4997 | 330.3236 |
| 27 | -196.7721 | 340.1067 |
| 30 | -199.9201 | 347.3148 |

**Figure 4.9 Indonesia IRF (graph)**



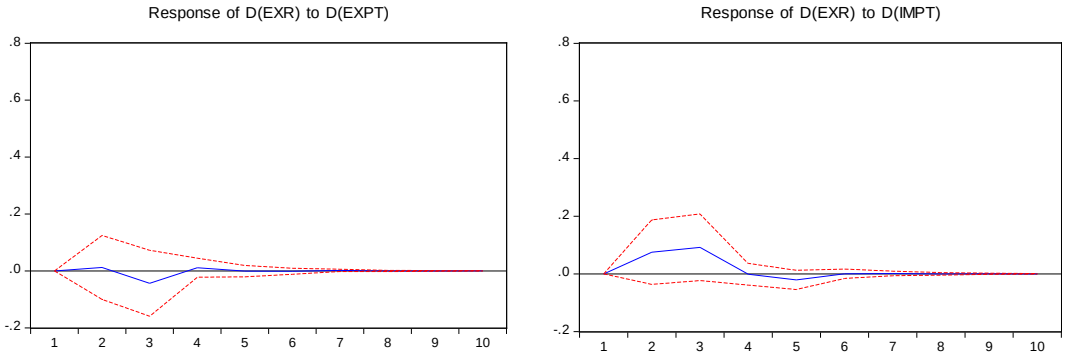

Indonesia seemingly has the same movement in response of exchange rate shock. However, Indonesia IRF test result shows the larger trend of response. The export shows the negative trend in rensponse of exchange rate shocks, it is decreasing each period. While the import variable showing a positive trend in response to the exchange rate shocks. In brief, Indonesia's trade balance shows a huge impact on responding the exchange rate shock, and has a slow response in countering the exchange rate shock effect duration. Means that, Indonesia still need to remanage

their trade balance performance and encourage their exchange rate instability to get sustainable economic condition.

5. Philippine

The last is Phillipine impulse response function result to see the impact on trade balance when exchange rate get shocked, the result can be seen below;

**Figure 4.10 Philippine IRF (graph)**




The findings above shows the response of Philippine trade balance variables towards exchange rate shocks. According to the table and figure above, the export variable start the trend with positive and smooth response up to second period and having a negative response in the third period. The response get stable in the fourht period ahead. Import varible starts the trend with positive response up to fourth period before it goes down until hit the negative trend in the sixth period. The trend got stable in the sixth period ahead.

### 4.1.6 Variance Decomposition

Variance Decomposition shows the further relationship between variables. It showed the degree of effect caused by variables due to the shock occurs in the research. The estimation result of five countries will be explained as a whole, the result table will be provided below;

**Table 4.12**
**Variance Decomposition**

**Singapore**

| Period | Position on EXR | | | Position on EXPT | | | Position on IMPT | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXR | EXPT | IMP | EXR | EXPT | IMP | EXR | EXPT | IMP |
| 1 | 100.00 | 0.00 | 0.00 | 14.04 | 85.95 | 0.00 | 10.98 | 60.58 | 28.42 |
| 5 | 97.44 | 0.22 | 2.32 | 39.78 | 55.36 | 4.85 | 45.63 | 39.57 | 14.79 |
| 10 | 96.69 | 0.12 | 3.18 | 49.41 | 38.30 | 12.28 | 62.34 | 27.87 | 9.78 |
| 15 | 96.17 | 0.12 | 3.69 | 52.40 | 28.86 | 18.73 | 70.47 | 21.53 | 7.98 |
| 20 | 95.82 | 0.15 | 4.01 | 53.50 | 22.98 | 23.50 | 75.24 | 17.55 | 7.20 |
| 25 | 95.58 | 0.17 | 4.23 | 53.98 | 19.05 | 26.96 | 78.35 | 14.84 | 6.78 |
| 30 | 95.41 | 0.19 | 4.39 | 54.22 | 16.27 | 29.50 | 80.56 | 12.88 | 6.55 |

**Malaysia**

| Period | Position on EXR | | | Position on EXPT | | | Position on IMPT | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXR | EXPT | IMP | EXR | EXPT | IMP | EXR | EXPT | IMP |
| 1 | 100.00 | 0.00 | 0.00 | 5.48 | 94.51 | 0.00 | 10.39 | 55.95 | 33.65 |
| 5 | 98.73 | 0.99 | 0.26 | 22.86 | 74.76 | 2.36 | 32.97 | 41.72 | 25.29 |
| 10 | 96.48 | 2.32 | 1.18 | 50.23 | 35.12 | 14.64 | 44.45 | 24.08 | 31.46 |
| 15 | 96.17 | 2.46 | 1.36 | 58.41 | 23.28 | 18.30 | 48.31 | 18.34 | 33.33 |
| 20 | 96.05 | 2.51 | 1.42 | 61.81 | 18.38 | 19.80 | 49.78 | 16.03 | 34.17 |
| 25 | 95.96 | 2.56 | 1.47 | 63.98 | 15.30 | 20.70 | 50.74 | 14.59 | 34.66 |
| 30 | 95.91 | 2.58 | 1.49 | 65.43 | 13.24 | 21.32 | 51.37 | 13.62 | 34.99 |

**Thailand**

| Period | Position on EXR | | | Position on EXPT | | | Position on IMPT | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXR | EXPT | IMP | EXR | EXPT | IMP | EXR | EXPT | IMP |
| 1 | 100.00 | 0.00 | 0.00 | 2.86 | 97.13 | 0.00 | 0.81 | 27.02 | 72.16 |
| 5 | 96.72 | 1.64 | 1.63 | 5.76 | 87.81 | 6.42 | 2.43 | 36.80 | 60.75 |
| 10 | 92.62 | 4.78 | 2.59 | 24.15 | 66.04 | 9.80 | 5.47 | 32.83 | 61.68 |
| 15 | 90.89 | 6.16 | 2.94 | 34.29 | 54.97 | 10.73 | 6.99 | 31.20 | 61.80 |
| 20 | 90.00 | 6.87 | 3.12 | 39.86 | 48.84 | 11.29 | 7.76 | 30.34 | 61.88 |
| 25 | 89.44 | 7.32 | 3.23 | 43.48 | 44.86 | 11.65 | 8.25 | 29.88 | 61.94 |
| 30 | 89.05 | 7.62 | 3.31 | 46.01 | 42.07 | 11.91 | 8.58 | 29.43 | 61.97 |

**Indonesia**

| Period | Position on EXR | | | Position on EXPT | | | Position on IMPT | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXR | EXPT | IMP | EXR | EXPT | IMP | EXR | EXPT | IMP |
| 1 | 100.00 | 0.00 | 0.00 | 0.92 | 99.07 | 0.00 | 0.75 | 42.72 | 56.52 |
| 5 | 93.97 | 3.24 | 2.77 | 4.92 | 94.33 | 0.74 | 6.819 | 61.41 | 31.76 |
| 10 | 82.40 | 6.46 | 11.13 | 4.10 | 93.07 | 2.81 | 5.78 | 76.67 | 17.53 |
| 15 | 71.73 | 8.91 | 19.34 | 3.24 | 91.08 | 5.66 | 4.31 | 83.27 | 12.41 |
| 20 | 63.61 | 10.62 | 25.76 | 2.63 | 89.16 | 8.20 | 3.25 | 85.53 | 11.23 |
| 25 | 57.68 | 11.80 | 30.50 | 2.20 | 87.58 | 10.20 | 2.54 | 86.07 | 11.38 |
| 30 | 53.34 | 12.64 | 34.01 | 1.91 | 86.33 | 11.75 | 2.06 | 85.98 | 11.94 |

**Philippine**

| Period | Position on EXR | | | Position on EXPT | | | Position on IMPT | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXR | EXPT | IMP | EXR | EXPT | IMP | EXR | EXPT | IMP |
| 1 | 100.00 | 0.00 | 0.00 | 1.64 | 98.35 | 0.00 | 0.15 | 13.20 | 86.63 |
| 5 | 99.15 | 0.04 | 0.80 | 3.92 | 92.33 | 3.74 | 2.66 | 43.86 | 53.47 |
| 10 | 99.35 | 0.22 | 0.41 | 4.19 | 89.89 | 5.90 | 6.79 | 59.40 | 33.80 |
| 15 | 99.40 | 0.29 | 0.29 | 4.25 | 88.92 | 6.81 | 8.55 | 65.36 | 26.08 |
| 20 | 99.43 | 0.33 | 0.23 | 4.29 | 88.41 | 7.29 | 9.47 | 68.54 | 21.97 |
| 25 | 99.44 | 0.35 | 0.19 | 4.31 | 88.08 | 7.59 | 10.05 | 70.52 | 19.42 |
| 30 | 99.45 | 0.37 | 0.17 | 4.33 | 87.87 | 7.79 | 10.44 | 71.87 | 17.68 |

The findings shows the most influence variable due to the other variables. From the table above, the five countries have different pattern of result. Singapore's exchange rate variable in the first period is 100% then decreasing each period, until hit the point of 95% in the thirthy period. The exports of Singapore are influenced by exchange rate at the point of 14% in the first period, while it decreasing extremely in the 30th period. Influenced by exchange rate

(54%) and import (29%). Singapore's import variable are influenced by two others in the first period, these are exchange rate (10%) and export (60%). The rest is influenced by import variable itself. At the 30th period, the export and import variables decreasing extremely and letting exchange rate taking the place in influencing the import variable. From the findings, exchange rate are mostly taking a huge part in influencing the others variables. Means that, Singapore trade balance are fully conducted by its currency.

Malaysia's exchange rate variables are influenced by its own variable in the first period. In the 30th period, export and import variables are influencing the exchange rate in the amount of 4%. In this case, Malaysia's exchange rate policy is not really influenced by their trade balance variables. Malaysia's export variable are influenced by exchange rate at the amount of 5% in the first period, decreasing each period. at the 30th period, Malaysia's export are mostly influenced by exchange rate (65%) and then influenced by import (21%). Malaysia's import is influenced by exchange rate (10%) and export (55%) which has the big influence on Malaysia import in the first period. In the 30th period, Malaysia's import are mostly influenced by exchange rate (51%) rather than export (13%). In conclusion, Malaysia's trade balance are mostly conducted by it is exchange rate as the Singapore does.

From the finding above, Thailand's exchange rate are little effected by their trade balance variables (export 7%, import 3%). Means that, their exchange rate variable are not really influenced by their trade balance. Thailand export has influenced by exchange rate in the last period, eventhough their export variable

are still has a big influence for the variable itself. Thailand import are mainly influenced by it is own variable, then export and exchange rate are the second and third most influence to the import variable.

Indonesia exchange rate are influence by its import (34%) rather than its export (12%), eventhough exchange rate variable itself has the bigger influence to it is own variable. Indonesia's export seemingly most influenced by its own variable rather than inport variable (11% in the 30th period) and exchange rate has the smallest influence toward export variable (1.9% in the 30th period). Indonesia import seemingly most influenced by export as well (85% in the 30th period). Means that, Indonesia trade balance are mostly influenced by export rather than exchange rate.

Philippine exchange rate are not really affected by trade balance variables, Philippine export only influence at the amount (0.3%) to the exchange rate in the 30th period, while import just influence the exchange rate at the amount (0.17%) in the 30th period. Philippine export is also mostly influenced by its own variable, as the table show that exchange rate is only influence export at the amount 1.6% in the first period and 4% in the 30th period. Their import is only influence at the amount 7.7% at the 30th period. Philippine import variable is mostly influenced by their export, as the table shows that in the first unltil 30th period, Philippine import are getting down each period while their export getting up. Their exchange rate seemingly not too influence in controling Philippine trade balance variables.