

Impact of Oil Palm and Rubber Price Shocks on Gdp Growth of Malaysia

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Abstract

Abstract: The research examines the relationship of price shocks of oil palm and rubber and GDP growth rate of Malaysia, in both short term and long term. Augmented Dickey-Fuller (ADF) unit root test is used to determine whether the variables are stationary. Error Correction Model is also used to examine the short run relationship of price shocks of oil palm and rubber towards GDP growth rate of Malaysia. The result of ADF test showed that all the variables: GDP growth, price shock of oil palm and rubber are stationary in all levels for further analysis of ARDL test. There is the significant effect of price shocks on GDP both in the long run and short run. Price shocks of oil palm showed negative affect on the GDP both in long run and short run while that of rubber affect the GDP growth positively in the long run and insignificant positive effect in the short run. The results could be used by policy makers to improve the existing economic policy to put more effort on expanding the wellspring of income of the country and could be used as a reference about price shocks effect to the country's economy.

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I. Introduction

Agriculture sector plays an important role in Malaysia's economic growth because Malaysia is one of the main exporters of oil palm and rubber in the world. In addition, with the expansion of existing plantation more and more plantation has been established. So, the potential of the oil palm quite high in increase the economy. The effect of oil palm and rubber in the agriculture sector to Malaysia economic growth have been taken seriously by the local government and existing few organizations to manage and compute the price of two crops toward economic growth. Since the beginning of oil palm development plantation about a century ago, the national agricultural land bank contributed by the oil palm as much as 71%. Besides that, the minor sector in Malaysia

Economy is agriculture sector. In 1960, agriculture sector is contributed around 37% to GDP and it decreased intensely to 10.7% GDP in year 2000 [1]. The Malaysia agriculture sector in the year 1980, natural rubber play an important role in increasing the economy and the GDP for natural rubber is 22.9 %. Natural rubber contributed around 39.8% of GDP, in year 1984. According to [2], the long-term and short term shows the impact of crude oil, crude palm oil and rubber price shocks towards Malaysia GDP growth was studied and the results showed that in both long run and short run term, the price shocks of oil palm affect the GDP growth. In the long run, oil price shocks will have a negative impact on GDP growth and will have positive and negative effects in the short term. According to [2] the commodity price shocks are important

external shock and are often considered a problem for economic growth in sub-Saharan Africa and the result indicated that the Sub-Saharan Africa per capita GDP growth is asymmetric respond to commodity price shocks.[2]studied the relationship of crude oil, crude palm oil and rubber price shocks and GDP growth rate of Malaysia. The researchers identified the result of crude oil, crude palm oil and rubber toward GDP growth rate in the long-term and short-term for first quarter of the year 2000 to the third quarter of the year 2016.The problem of price shocks of two main commodities of Malaysia: oil palm and rubber and their prices are volatile, and the price shock of commodities may affect the economic growth [2]. In Malaysia, the major crop of export include oil palm and rubber and the effect of price shocks of these two products have a great impact on the country's GDP in Malaysia.

The two main commodities (oil palm and rubber) in the agriculture sector of Malaysia have one similar in a characteristic which is their price is volatile. Malaysia is a net exporter for these two commodities and their price shocks may affect the development of Malaysia economy. Thus, the question arises whether the price shocks of oil palm and rubber effect the GDP growth. There is some past research on the movement of GDP growth will be affected by the movement price of oil palm and rubber in recent years. However, the question remains how the effect of price shocks of oil palm and rubber towards GDP growth on Malaysia in the long run and short run by using time series data from 1983 until 2017 (35 years). In this research will aim to answer this question. General objective of this research is to investigate the impact of price shocks of oil palm and rubber towards gross domestic product growth (GDP) of Malaysia. The specific objective of the study include: (i)to analyse the relationship between the price shock of oil palm and the GDP growth in long run and short run and (ii) to analyse the

relationship between the price shock of rubber effect the GDP growth in long run and short run.

II. Literature Review

[3] Showed the long-term rubber production required premeditating the economic development, the area planted, technological innovation and prices. Thus, the age-composition of trees also wants to rely on rubber production and not only on the area planted. In medium-term, the returning movement of the global economy was primarily connected to the rubber economy. Nevertheless, the primary weather, exchange rate fluctuations, futures markets interventions and unstable demand were the short-term factors.

[4] Studied about a province in Indonesia which is West Kalimantan that plays an important role in oil palm and rubber production. This research to investigate the relationship of oil palm and rubber production to the welfare of inhabitants in ten districts in West Kalimantan. In this case, the Gross Domestic Product of every district was used to measure the welfare of the inhabitants. Furthermore, the oil palm and rubber production are statistically significant to the GDP of the districts had been proved by the research. After that, although oil palm and rubber production often have a negative impact on the environment research has shown that oil palm and rubber production has a positive impact on increasing the welfare of the inhabitants.

Empirically, it has been found that moderate price volatility in palm oil, and the short-term effects the domestic price of selected palm oil products in one-way and two-way price fluctuations spilled over. Stabilized palm oil prices can be achieved by monopolizing the market power of producers or forming producer cartels or buyers and sellers through international commodity agreement [5]. [6]showedhigh volatility of natural rubber prices today poses significant risks to producers, traders, consumers and other parties involved in natural

rubber production. It is worth noting that the crude oil prices decrease caused by the fall in international natural rubber prices reduces in prices again in 2009. Standard Malaysia Rubber 20 (SMR20) price always change frequently. Therefore, agricultural commodities futures trading were introduced to offer an effective price discovery mechanism and to offer a hedging mechanism that resists the risk of price instability. Natural rubber prices fluctuate the same as any agricultural product.

According to [7] there was an argument about poorly to commodity price shocks have responded by some developing countries. As a result, the debt problem has been aggravated and the economic growth rate is very low. This may be due to the inability to benefit from positive shocks and the inability to avoid the huge losses caused by negative shocks. [8] emphasize the importance of positive and negative price shocks when considering whether aid can mitigate the impact of such shocks. As a result, agricultural prices may have a major impact on the economic growth of sub-Saharan African countries, and one might expect a positive shock on commodity prices to react differently to negative price shocks.

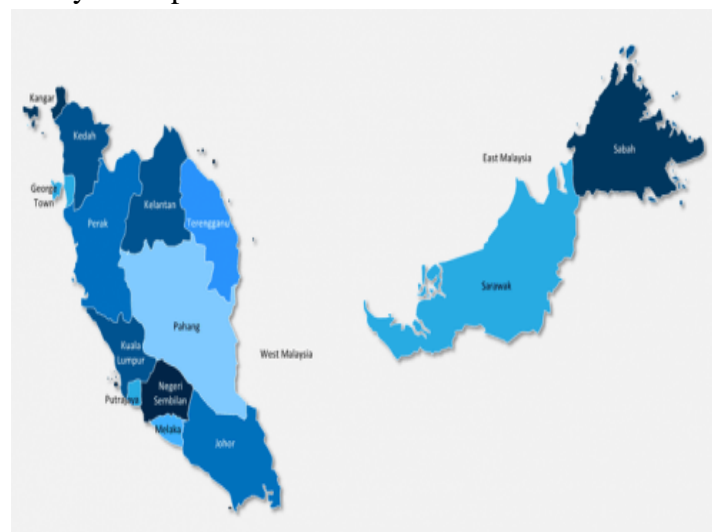
According to [9] there is little evidence is asymmetry to reveal whether positive or negative agricultural product price shocks will respond differently to per capita economic growth. [10] show the price shocks of commodities play an important role in determinants of macroeconomic fluctuation. After that is the investment-specific technology shocks for the United States of America. [10] stated that the impact of commodity price shocks is a very important determinant of macroeconomic fluctuation, second only to investment-specific technology shocks against the United States. Using the Johansen Co-integration test, [11] indicated that there is a long-term relationship between commodity prices volatility, inflation expectations and Brazil's GDP level.

According to [12], oil revenues have a positive impact on Sudan's service sector GDP. It is estimated that between 2000 and 2012, the rate of change in GDP will be 78.8%. They also found that a unit change in oil revenue would affect the change in Sudan's GDP by 0.246%. The methods used for the research is linear regression and ordinary least squares, and the Johansen cointegration test is used to test whether there is a relationship between these two variables in long-term operation.

III. Research Methodology

3.1 Study Area

The chosen country for this research is Malaysia because Malaysia is the one the biggest exporter oil palm and rubber products in the global. Then, Malaysia is suitable area for my research title. The Malaysia map shows as below.



Source :

<https://www.sketchbubble.com/en/powerpoint-malaysia-map.html>

Figure 3.1: Malaysia map

3.2 Source of Data

The data set used for this research is secondary time series data of price shocks of oil palm, price shocks of rubber and the Malaysia GDP growth from 1983 to 2017. The price of oil palm and rubber are collected from Department of Statistic Malaysia (DOSM), the price shocks of oil palm is using the palm kernel price. The price is

calculated in Local Delivered Average Price which mean the average for 12 months traded price up to the local buyers destination and unit for oil palm price is RM/Ton. The price shock of rubber is using the natural rubber (SMR20) price. The price of rubber is calculated in average traded price for 12 months on SMR20 natural rubber and unit for rubber price is RM/Ton. The GDP data is collected from DOSM in term of RM/Million and the GDP data only specific in Malaysia. Based on the trend of the raw time series data of price shocks of oil palm and price shocks of rubber showed unstable trend. The raw data sets of oil palm and rubber price shocks are going transform by using three years moving average in order to create the time series data set for the analysis.

3.3 Specification of The Model

3.3.1 Specification of Multiple Regression Model
GDP growth is representative of economic growth of Malaysia. The GDP changes or grows from one year to another is showing how is the performance of economic for a country. GDP shows in a particular time period for the market value of all the goods and services produced in a country. The price shocks of oil palm is the unexpected on oil palm price either it increase or decrease. The oil palm price is referring to the palm kernel price and count in RM/ton. The price of oil palm in Malaysia will recorded daily by Malaysia Palm Oil Board (MPOB) because oil palm is one of the important commodity to effect the economic growth. The price shocks of rubber is the unpredictable on price of rubber either it increase or decrease. The rubber price based on the natural rubber SMR20 and it compute in RM/ton. Malaysia rubber price will be recorded daily price in Malaysia Rubber Board (LGM), the reason exit this special agency shows rubber importance in Malaysia economic. The multiple regression model used for this research is constructed as follow:

$$GDPG_t = \beta_0 + \beta_1 PSOILP_t + \beta_2 PSRUB_t + \epsilon_t \quad (1)$$

Where:

GDPG_t : GDP Growth Rate of Malaysia at time t

PSOILP_t : Price Shocks of Oil Palm at the time t

PSRUB_t : Price Shocks of Rubber at the time t

β₀ : Intercept or Constant

β_i : Estimated Coefficient of Variables (i = 1,2)

ε_t : Error term at time t

To determine the variables of the price shocks of two commodities, which are oil palm and rubber, are known as external shocks that may affect the output of the country measured by the gross domestic product (GDP). For construct the model, the GDP as dependent variable and the price shocks of oil palm and rubber are the independent variable.

The Autoregressive (1) model is using to obtain the price shocks of oil palm price and it also known as AR (1) model on oil palm price. [13] Huang & Guo (2007) is using this method to appraise the volatility of the commodities price and it can derived by using Ordinary Least Squared method (OLS). The method is as below:

$$PSOILP_t = \beta_0 + \beta_1 OilPalmPrice_{t-1} + \epsilon^2_t \quad (2)$$

$$OilPalmPrice_t = \beta_0 + \beta_1 OilPalmPrice_{t-1} + \epsilon_t \quad (3)$$

Equation 3 is oil palm prices shows β₀ is a constant, β₁ is lag 1 on the coefficient of oil palm price and the error term at time t is ε_t. This autoregressive model running the OLS equation to construct oil palm price shocks in the form of ε²_t and saving the estimated residual series and then square the residuals to represent price shocks shows by equation 2 The unit of oil palm price is per ton is in RM and data is acquired from DOSM.

The price shocks of rubber price are formulated by using Autoregressive (1) model. In others words known as AR (1) model on price of rubber. The method is as below:

$$PSRUB_t = \beta_0 + \beta_1 RubberPrice_{t-1} + \epsilon^2_t \quad (4)$$

$$\text{RubberPrice}_t = \beta_0 + \beta_1 \text{RubberPrice}_{t-1} + \varepsilon_t \quad (5)$$

Equation 5 for rubber price shows β_0 is constant, β_1 known as lag1 on the coefficient of rubber price and the error term at time t is ε_t . The autoregressive model provides rubber price shocks in the form of ε^2_t and it build by running the OLS equation and save the estimated residual series and then square the residuals to represent them shows by equation 4. Rubber price unit for this research is per ton in RM and data is acquired from DOSM.

GDP growth rate is proxy economic growth. There are some researcher such as [8],[11] and [2] use GDP growth rate to analysis the economic growth. The formula to compute the GDP growth rate is as below:

$$\text{GDPG}_t = (\text{GDP}_1 - \text{GDP}_0) / (\text{GDP}_0) \times 100 \quad (6)$$

Where: GDPG_t = Nominal GDP Growth Rate at time t

GDP_1 = GDP of the current period.

GDP_0 = GDP of the previous period.

Equation 6 shows the GDP growth rate for this research is in percentage form with multiplying the rates by 100. The yearly data of Malaysia GDP growth rate was collected from the World Bank database.

3.3.2 Autoregressive Distributed Lag Bounds Test (ARDL)

The ARDL test is used to test the cointegration relationship between Malaysia GDP growth and price shocks of oil palm and rubber in long term period. This is because many new research such as [14] and [2] are using this method to investigate long run relationship between variables. The factor of the frequent use of ARDL method is that Johansen Cointegration test can only be used if all variables are I(1) and ADRL method can testing on different level. ARDL method is more flexibility in terms of stationarity condition of the variables whether the mixture of I(1) and I(0) or both as long as the variables are not more than

I(2). The ARDL model equation is shown as below:

$$\begin{aligned} \Delta \text{GDPG}_t = & \lambda_0 + \sum_{i=1}^p \lambda_1 \Delta \text{GDPG}_{t-i} \\ & + \sum_{i=0}^p \lambda_2 \Delta \text{PSOILP}_{t-i} + \sum_{i=0}^p \lambda_3 \Delta \text{PSRUB}_{t-i} + \\ & \lambda_4 \text{GDPG}_{t-1} + \lambda_5 \text{PSOILP}_{t-1} + \lambda_6 \text{PSRUB}_{t-1} + \varepsilon_t \end{aligned} \quad (7)$$

The symbol Δ represent first differencing operator of the listed variables. The short run dynamics is equal to λ_1 , λ_2 and λ_3 and the long run relationship is λ_4 , λ_5 and λ_6 . The null and alternate hypothesis for cointegration among variables is shown as below:

$$H_0: \lambda_4 = \lambda_5 = \lambda_6 = 0 \text{ (No cointegration)}$$

$$H_1: \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0 \text{ (Cointegration)}$$

The F-test will determination on whether to reject or fail to reject the null hypothesis. Reject null hypothesis and accept alternate hypothesis when the F-statistic is higher than the upper bound critical values and it is cointegration among the variables. In other words, accept null hypothesis and reject the alternate hypothesis when the F-statistic is lower than the upper bound critical values, then, there is no cointegration among the variables. The optimal lag length must be estimated before deciding on the ARDL model.

3.3.3 Validity Test- Augmented Dickey-Fuller Unit Root Test (ADF)

Augmented Dickey-Fuller (ADF) unit root test (Dickey & Fuller, 1979) is used in this research. This test is to determine whether the three variables which are Malaysia GDP growth and the price shocks of oil palm and rubber is stationary. This method has been used by some researchers to determine stationary of their data. The ADF unit root test in regression form used in this research as below :

$$\Delta y_t = \beta_1 + \delta y_{t-1} + \alpha_i \sum_{i=1}^p \Delta y_{t-1} + \varepsilon_t \quad (8)$$

Where:

Δy_t = First differencing operator for variable of interest {GDPG, PSOILP, PSRUB}

ρ = Optimal lag
 ε = Constant variance and residual of zero mean and

$\{\beta_1, \delta, \alpha_i\}$ = Set of parameters to be estimated
Phillips-Perron (PP) test is used to confirm the unit root property of the sample data and it also work on the results of ADF test. The function of Δy_{t-1} term is the lagged difference term and remove the serial correlation of the disturbance term, and the first difference refer by Δ . The null hypothesis of unit root test contains a unit root, when the time series are not stationary if the t-statistic is larger than the critical value, $I(0)$. The null hypotheses is rejected result no unit root and is stationary if the t-statistics is smaller than the critical value, $I(1)$. The null hypothesis and alternate hypothesis are shown as follows:

$H_0: \delta = 0$ (y_t is has unit root or non-stationary)
 $H_1: \delta \neq 0$ (y_t is does not have unit root or stationary)

3.3.4 Error Correction Model (ECM)

Error Correction Model is to examine the short run relationship of price shocks of oil palm and rubber towards GDP growth rate of Malaysia. ECM is achieve the second research objective of this research based on ADRL. ECM will be use to examine the short run relationship when happened cointegration between the variables. So, ECM executed after cointegration test. The ECM model for short run is shown as below:

$$\Delta \text{GDPG}_t = \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta \text{GDPG}_{t-i} + \sum_{i=0}^p \alpha_2 \Delta \text{PSOILP}_{t-i} + \sum_{i=0}^p \alpha_3 \Delta \text{PSRUB}_{t-i} + \alpha_4 \text{ECT}_{t-1} + \varepsilon_t \quad (9)$$

Symbol Δ represented as first differencing operator shows α_0 is a constant The estimated coefficients of the variables are α_1, α_2 and α_3 , while the optimal length of lag is ρ . The lagged error correction term shows by ECT_{t-1} and the error term in respect to time is ε_t . ECT_{t-1} measures the disequilibrium in the corrected

cointegration model to achieve equilibrium adjustment speed over a period of time. In order to prove that there is cointegration between variables, the sign of the error correction coefficient must be negative and statistically significant. The coefficient of the independent variables can be identified the short run relationship. The proven that the independent variables whether have short run relationship towards the dependent variable by looking at the p-value.

IV. Results and Discussion

4.1 Price Shocks Model

4.1.1 Price Shocks of Oil Palm

To found out the price shock of oil palm is using the Ordinary Least Squares Test result to form an equation to calculate new set of data about oil palm price shocks. The result shows in table 4.1 and get the coefficient value to create a formula as below:

$$\text{PSOILP}_t = 373.6731 + 0.810199 * \text{POPNT}_{t-1} + \varepsilon^2 t$$

This model is significant because the coefficient for constant is 373.6731 and p-value is 0.0277 which shows statistically significant at 5% significant level. Besides, the lag1 on the coefficient of oil palm price (POPNT) is 0.810199 and 0.0000 in term of p-value which statistically significant at 1% significant level. Therefore, the model is suit to use for calculate the price shocks of oil palm.

Table 4.1: Ordinary Least Squares Test for Price Shocks of Oil Palm

| Variable (Dependent variable is POPO) | Coefficient | Std. Error | t-Statistic | Prob. |
|---------------------------------------|-------------|------------|-------------|--------|
| POPNT | 0.810199*** | 0.093770 | 8.640311 | 0.0000 |
| C | 373.6731** | 162.1889 | 2.303937 | 0.0277 |

***, **, * imply that significance at 1%, 5%, 10% level, respectively.

4.1.2 Price Shocks of Rubber

To found out the price shock of rubber is using the Ordinary Least Squares Test result to form an equation to calculate new set of data about rubber price shocks. The result shows in table 4.2 and get the coefficient value to create a formula as below:

$$PSRUB_t = 779.5059 + 0.864155 * PRUBN_{t-1} + \varepsilon^2_t$$

The model is significant because the coefficient for constant is 779.5059 and 0.0698 in term of p-value which shows statistically significant at 10% significant level. Besides, the lag1 on the coefficient of oil palm price (PRUBN) is 0.864155 and p-value is 0.0000 which the statistically significant at 1% significant level. Thus, this model establish to use for calculate the price shocks of rubber.

Table 4.2: Ordinary Least Squares Test for Price Shocks of Rubber

| Variable (Dependent variable is PRUBO) | Coefficient | Std. Error | t-Statistic | Prob. |
|--|-----------------|--------------|--------------|------------|
| PRUBN | 0.864155* ** | 0.0804 92 | 10.735 97 | 0.000 0 |
| C | 779.5059* | 415.90 46 | 1.8742 42 | 0.069 8 |

***, **, * imply that significance at 1%, 5%, 10% level, respectively.

The result for price shocks of oil palm in Table 4.1 above shows the coefficient is significant to use by forming the price shocks formula for oil palm. The formula uses for compute the price shocks of oil palm with substitute the raw data of oil palm price (RM/tonne) each year from 1983 to 2017 into the formula can create a new set of data. Price shocks of rubber data is using same method will the price shocks of oil palm. Based

on Table 4.2 shows coefficient is significant to build the price shocks formula for rubber. The formula uses for compute the price shocks of rubber with substitute the raw data of rubber price (sen/kg) each year from 1983 to 2017 into the formula can create a new set of data. The new set of data of price shocks of oil palm and rubber is use for ARDL test in this research.

4.2 Autoregressive Distributed Lag Bounds Test (ARDL) Model

4.2.1 Association of Price Shocks of Oil Palm and Rubber For Long Run

The long run coefficient from Table : 4.3 shows ARDL by using the dependent variable was GDP growth rate of Malaysia (GDPG) while the independent variables, also known as regressors are price shocks oil palm and rubber (PSOILP and PSRUB). The equation form as below:

$$GDPG = 3.056689 - 1.742136PSOILP + 1.112279PSRUB$$

GDPG(-1) is negative sign and significant at 1% level. GDP growth rate increase 1% will cause in a 1.34% decrease in the GDP growth rate. Price shocks of oil palm increase 1% in the results in a 1.74% decrease in the GDP growth rate and it's significant at 10%. In 1% increase in price shocks of rubber will result in 1.11% increase the GDP growth rate. However, there is not significant for the lagged price shocks of rubber coefficient. This recommends that in the long run, the higher price shocks of rubber will cause rising in the GDP growth rate, while, higher GDP growth rate is cause by the higher price shocks of rubber in a in the long run.

Table 4.3 : Long Run Coefficient

| Variable (Dependent variables is GDP) | Coefficient | t-Statistic |
|---------------------------------------|------------------|---------------|
| GDPG(-1) | - 1.341378*** | - 4.186159 |
| PSOILP(-1) | -1.742136* | - |

| | | |
|-----------|------------|----------|
| | | 1.786692 |
| PSRUB(-1) | 1.112279 | 1.619416 |
| C | 3.056689** | 2.538701 |

| | |
|-------------|----------|
| Akaike info | |
| criterion | 0.134596 |
| Schwarz | |
| criterion | 0.542734 |
| R-squared | 0.623531 |
| Adjusted | |
| R-squared | 0.498042 |

Note: ***, ** and * mean significant at 1%, 5% and 10%.

4.2.1.1 Serial Correlation Test

The model went through the Breush-Godfrey Serial Correlation LM Test is to test whether the error terms are auto-correlated. There is no autocorrelation shown by null hypothesis and the alternate hypothesis is autocorrelation.

Result shows the computed F-stat is 0.4932 and the p-value is 0.6172 and it's p-value greater than 0.05. The result has shown that failed to reject null hypothesis. Therefore, not auto-correlated for the error terms.

Table 4.4 :Breusch-Godfrey Serial Correlation LM Test For Long Run

| | | |
|------------------|--------|-------|
| F-statistics | 0.4932 | 4.2.1 |
| Prob. F | 0.6172 | .2 |
| Obs*R-squared | 1.4162 | CUS |
| Prob. Chi-Square | 0.4926 | UM |
| | | Test |

To examined the stability of the long-run parameters for the equation and the test relied on cumulative sum (CUSUM) tests applied by [15] to test the stability of the long-run coefficients. The red lines are the 5 % level of significance for the tests, if the plot over the red line is showing unstable regression equation. Based on the Figure 4.1 it can be concluded that exists the long-run relationships among variables and thus shows the stability of coefficient as the plot of CUSUM

stays within the critical 5% bounds of significant level.

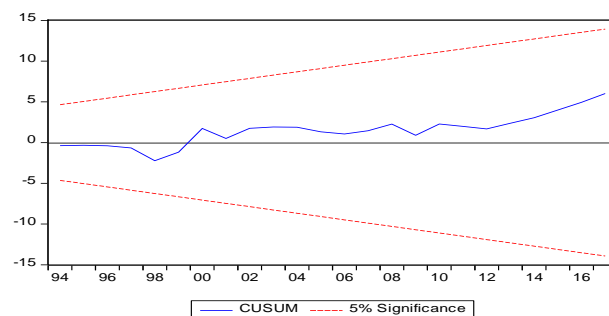


Figure 4.1 : CUSUM Test For Long Run Relationship

4.2.1.3 Wald Test Long Run Co-integration

In Table 4.5 result shows the critical value for 5% and 10% significant are obtained from [16] Wong et, al.(2018) for [17]Narayan (2005) table with number of regressors of 2 and sample size of 35. The computed F-stat is 5.913034 and it is higher than the upper bound for both 5% and 10% significant level. Thus, it can concluded that is co-integrated for variables.

Table 4.5: Wald Test For Long Run Cointegration

| Model | F-statistic | |
|---------------------|-------------|-------------|
| GDPG=PSOILP=PERUB=0 | 5.913034*** | |
| Narayan (2005) | k = 2, n=35 | |
| Critical Value | Lower bound | Upper bound |
| 5% | 4.183 | 5.333 |
| 10% | 3.393 | 4.410 |

Note: ***, ** and * mean significant at 1%, 5% and 10%.

4.2.2 Association Of Price Shocks of Oil Palm and Rubber For Short Run

Error correction corresponding to ARDL model shows by Table 4.6 and using the dependent variable was Malaysia GDP growth rate (GDPG) while the independent variables, also known as regressors are price shocks oil palm and rubber (PSOILP and PSRUB). The ECM(-1) coefficient sign is negative and statistically significant at 1%

significance level. Therefore, the long run relationship between these variable are proven by the result of Wald Test For Long Run Cointegration. The equation of ECM(-1) or the cointegration equation is as follows:

$$ECM(-1) = GDPG - (3.056689 - 1.742136PSOILP + 1.112279PSRUB)$$

Malaysia GDP growth rate affects by oil palm price shocks negatively while rubber price shocks affects the dependent variable positively, both in the long run. The ECM(-1) coefficient shows ECM speed of adjustment is 110.60% of

corr
ecti
on
per
peri
od

| | |
|------------------|----------|
| F-statistics | 0.352714 |
| Prob. F | 0.7064 |
| Obs*R-squared | 0.6243 |
| Prob. Chi-Square | 0.942269 |

from disequilibrium towards long run equilibrium, in this case, per years.

Observing the coefficient of the repressors can be conducted the short run analysis which are D(PSOILP(-1)) is variable that have significant short run relationship to GDP growth of Malaysia. Oil palm price shocks in short run coefficient is negative sign. These results are supporting yet contradicting the theory of RBC at the same time since the signs of coefficient are vary where according to the particular theory, the negative signs of coefficient must be in all variables.

Table 4.6 : Error Correction Corresponding to the ARDL Method

| Variable (Dependent variables is GDP) | Coefficient | Std.Erro r | t- Statistic | Prob. |
|--|-------------|---------------|-----------------|------------|
| D(GDPG(-1)) | 0.026492 | 0.17970 9 | 0.14741 4 | 0.883 9 |
| D(PSOILP) | -0.667362 | 0.52432 8 | 1.27279 5 | 0.214 4 |
| D(PSOILP(-1)) | -0.829812* | 0.44322 5 | 1.87221 3 | 0.072 5 |
| D(PSRUB) | 0.964403 | 0.57504 6 | 1.67708 9 | 0.105 5 |
| D(PSRUB(-1)) | 0.312932 | 0.49719 9 | 0.62939 0 | 0.534 6 |

| | | | | |
|--------------------|-----------------|--------------|--------------|------------|
| ECM(-1) | 1.105960** * | 0.27634 2 | 4.00213 8 | 0.000 5 |
| C | 0.003252 | 0.04182 2 | 0.07776 0 | 0.938 6 |
| R-squared | 0.594858 | | | |
| Adjusted R-squared | 0.501363 | | | |

Note: ***, ** and * mean significant at 1%, 5% and 10%.

4.2.2.1 Serial Correlation Test

Based on Table 4.7: Breusch-Godfrey Serial Correlation LM Test for Short Run, the computed F-stat is 0.352714 and the p-value is 0.7064 and it's p-value greater than 0.05. The result has shown that failed to reject null hypothesis. Therefore, not auto correlated for the error terms.

Table 4.7: Breusch-Godfrey Serial Correlation LM Test for Short Run

4.2.2.2 CUSUM Test

To find out the stability of the short run movement for the equation and the test relied on cumulative sum (CUSUM) tests applied by [15] Pesaran and Pesaran (1997) to test the stability of the residuals of the ECM model. The red lines are the 5% level of significance for the tests, if the plot over the red line is showing unstableregression equation. Based of the Figure 4.1 can be conclude that exists the short run relationships among variables and thus shows the stability of coefficient as the plot of CUSUM stays within the critical 5% bounds of significant level.

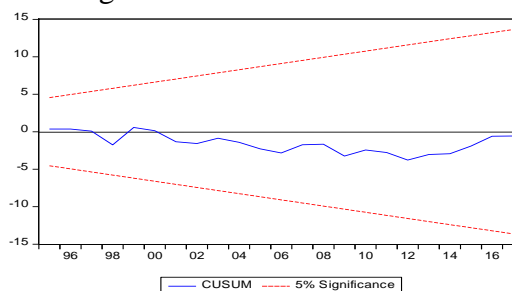


Figure 4.2 : CUSUM Test For Short Run Relationship

4.2.2.3 Wald test For Short Run Cointegration

Wald Test For Price Shock of Oil Palm Short Run Cointegration, the short run cointegration is between the lower and upper bound on the critical value for 5% and 10% significant are obtained from [16] [17] with number of regressors of 2 and sample size of 35. The computed F-stat for Model 1 and Model 2 are 2.797692 and 1.620008 is lower than the lower bound. In Model 3, F-stat is 3.505183 and it is between than the upper bound and lower bound for 10% significant level. Thus, it is concluded that the variables are co-integrated for short run.

Table 4.8 : Wald Test For Price Shock of Oil Palm Short Run Cointegration

| Model | F-statistic |
|-------------------------------|-------------|
| Model1: $PSOILP=PSOILP(-1)=0$ | 2.797692* |
| Model 2: $PSOILP=0$ | 1.620008 |
| Model 3: $PSOILP(-1)=0$ | 3.505183* |

| Narayan (2005) | | |
|----------------|-------------|-------------|
| k = 2, n=35 | | |
| Critical Value | Lower bound | Upper bound |
| 5% | 4.183 | 5.333 |
| 10% | 3.393 | 4.410 |

Note: ***, ** and * mean significant at 1%, 5% and 10%.

Wald Test For Price Shock of Rubber Short Run Cointegration, the short run cointegration is between the lower and upper bound on the critical value for 5% and 10% significant are obtained from [17] with number of regressors of 2 and sample size of 35. The computed F-stat for Model 1, Model 2, and Model 3 are 1.463208, 2.812628 and 0.396131 is lower than the lower bound. Thus, it is concluded that the variables are no co-integrated for short run.

Table 4.9 : Wald Test For Price Shock of Rubber Short Run Relationship

| Model | F-statistic |
|-----------------------------|-------------|
| Model1: $PSRUB=PSRUB(-1)=0$ | 1.463208 |
| Model 2: $PSRUB=0$ | 2.812628 |
| Model 3: $PSRUB(-1)=0$ | 0.396131 |

| Narayan (2005) | | |
|----------------|--|--|
| k = 2, n=35 | | |

| Critical Value | Lower bound | Upper bound |
|----------------|-------------|-------------|
| 5% | 4.183 | 5.333 |
| 10% | 3.393 | 4.410 |

Note: ***, ** and * mean significant at 1%, 5% and 10%.

The result of ARDL test for long run cointegration can be conclude as the price shocks of oil palm has negative long run relationship with the GDP growth of Malaysia and the price shocks of rubber has positive long run relationship with the GDP growth of Malaysia. Therefore, the price shocks of oil palm and rubber are affect to the GDP growth on Malaysia in long term.

In short run cointegration test, the price shocks of oil palm contain negative short run relationship to the GDP growth of Malaysia but the price shocks of rubber don't has relationship with the GDP growth of Malaysia.

According to [18] UPM, (2012), the oil palm tree take 2.5 to 3 years grow up as mature tree and able to harvest fruit from it. Besides that, [19] Anem, (2016) shows the rubber tree take 5 to 6 years to grow as mature tree to produces latex. Form this two studied can conclude as the price shocks of oil palm can affect the GDP growth of Malaysia in long run and short run and the price shocks of rubber can effect GDP growth in long run and can't effect in short run because the rubber take long time to produce production compare to oil palm. So, rubber cannot bring effect to GDP in short run.

4.3 Augmented Dickey-Fuller (ADF) Unit Root Test's Results

Based on the result, all the variables are integrated to level or the first difference which is I(0) or I(1). It is concluded that all variables are not stationary on I(0) level without trend but all variables stationary at I(0) with intercept and trend. In I(0) with intercept and trend, GDP growth rate of Malaysia (GDPG) and price shocks of oil palm

(PSOILP) is significant at 1% with t-stat (-5.5514) and (-4.5968), the price shocks of rubber (PSRUB) is significant at 5% with t-stat (-3.3893). In addition, GDPG t-stat is -5.6289 with 1% significant and PSRUB t-stat -3.2255 with 5% significant are stationary in I(0) with intercept. After first difference test I(1), all variables from I(0) without trend and PSOILP in I(0) with intercept become statistically significant in 1% and not having unit root. In I(1) without trend the all variables are stationary which are GDPG, PSOILP and PSRUB with t-stat (-7.522), (-7.6717) and (-8.3676). Besides that, the GDPG t-stat (-7.3957), PSOILP t-stat (-8.0275), and PSRUB t-stat (-8.2386) in I(1) with intercept also stationary. I(1) with intercept and trend for three variables are stationary with t-stat of GDPG (-7.2651), PSOILP(-7.9048) and PSRUB(-7.8544). The overall result of ADF conclude the data set for GDPG, PSOILP and PSRUB are stationary for the ARDL test in this research.

Table 4.10: ADF Unit Root Test's Results

| Variable | Level I(0) | | First Difference I(1) | | |
|----------|------------|---------------------|-----------------------|---------------------|---------------------|
| | Intercept | Intercept and trend | Intercept | Intercept and trend | Intercept and trend |
| GDPG | 0.1774 | 5.6289** | 5.5514* | 7.5222** | 7.3957* 7.2651** |
| PSOILP | 1.5423 | -1.1306 | 4.5968** | 7.6717** | 8.0275* 7.9048** |
| PSRUB | 1.0557 | 3.2255* | 3.7893* | 8.3676** | 8.2386* 7.8544** |

Notes:

1. ***, **, * imply that significance at 1%, 5%, 10% level, respectively.
2. The lag length for the ADF was selected using Schwarz Info Criterion (SCI).

4.4 GDP Growth In Malaysia

The data use for the Figure 4.3 is calculate by using the GDP growth rate formula from Chapter 3 and the equation (6), the raw data for calculate GDP growth rate is Malaysia GDP in term of RM/Million. After compute the result, it will form the graph shows in Figure 4.3. In Figure 4.3, the beginning of 1983, the Malaysia GDP growth rate is 6.25% increase to 7.76% in 1984 and it fall down for the next year 1985 which is -1.03% reach negative growth of economic. In 1986 to 1988 increase extremely to reach a new high level of GDP growth in Malaysia which is 9.94%. During next 8 years (1989-1996), the growth rate has been in the range of 9.89% to 10%. There are no significant changes in this time range. Furthermore, from 1997 to 1998, the GDP growth rate has been start going down in 1997 is 7.32% and 1998 is breaking the record since 1998 at the lowest point which is -7.36%.

The GDP growth rate happened going high up after the extremely decrease in 1998 and it shows an reflect in 1998 cause high increase until 2000 which is 8.86%. The GDP growth fell slightly to 0.52% next year in 2001 and it rise back to 5.39% in 2002. During next five years (2003-2007), the growth rate in the range of 5.79% to 6.30%. The GDP growth rate decrease to -1.51% in 2009 had created a new lowest point within this 10years since 2000. The next year 2010, extremely increase to 7.42%. Start from 2011 to 2017, the range of growth rate maintain in between 5.29% to 5.90%.

Overall, we could see that the GDP growth rate in 1985,1998 and 2009 happened very unstable trend and reached negative growth rate which are -1.03, -7.36% and -1.51%. Therefore, the interesting part is while happened negative growth it will cause the extremely high growth in GDP. In this 35 years of observation, the GDP growth rate in Malaysia is unstable and the growth rate become lowest compare between 1983 and 2017 which is 6.25% and 5.90%. This proved that the economic

in Malaysia is not very well compare with 35 years ago.

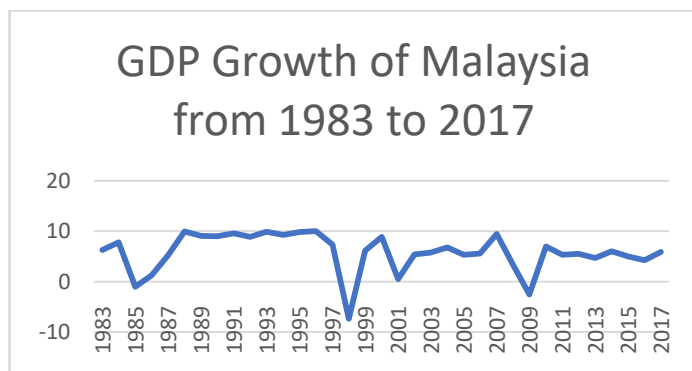


Figure 4.3 : GDP Growth of Malaysia from 1983 to 2017

V. Conclusion

The price shocks is the unexpected or unpredictable on price of commodity either it increase or decrease. So, the unexpected variables of price shocks of oil palm and rubber are use to determine how these commodities effect to our GDP growth in Malaysia. For the long run coefficients, oil palm and rubber price shocks are statistically significant in affecting GDP growth of Malaysia. The price shocks of oil palm shows negative impacts towards GDP growth while the price shocks of rubber positively effect to GDP growth.

A negative effect of price shocks of oil palm price and positive effect on rubber price which in contrast to the estimates of this research result, can be explained by checking the variables used in this research. The proxies of price volatility of all commodities in this research are estimated using Autoregressive (1) model where the residual squared are used. This method has flaw, including the inability to calculate the direction of the shocks. The one way direction of the volatility, which means whether the price increased or decreased drastically, it only captures the gradient, but does not capture the coefficient of the slope.

There is a possible explanation to explain the negative effect of oil palm price shocks towards Malaysia GDP growth which in this study, the

amount of negative shocks in the period used more than the positive shocks in the same period of time. Negative price shocks shows that a sudden increase in price. The oil palm for net exporters is an decrease of price of oil palm will causerising in GDP of the country. For the price shocks of rubber is the opposite case with the price shocks of oil palm. In the price shocks of particular commodities are supported by the studies which are Bahrain case study for a net exporter of oil concluded that increase GDP of Bahrain cause by increase of oil price[20] (Al-Ezzee, 2013). Another case in Russia which is the oil price increase will increase GDP of since Russia is a net-exporting country[21] (Khuram Safi & Liu, 2014).

After conducting the cointegration test, short term analysis using Error Correction model which is derived from ARDL model was tested. The results indicated that price shocks of oil palm have asymmetrical effects in short term and based on coefficient of short run there is a negative effect of oil palm price shocks towards economic growth of Malaysia. This result is the possible answer for the same as the long run coefficient of previous explanation on same variable, which is the flaw of the proxy of shocks itself. Short run coefficient of rubber shows no relationship between rubber price shocks of towards economic growth of Malaysia but price shocks of rubber is positive in the long run. So, the positive answer for the outcome is this commodity took long period to effect the Malaysia economic growth. This is because, rubber tree took long period to produce production and in short period don't has production to contribute to the economic. , the result from comparing the GDP growth with this two commodities are same as the outcome from this study which is the negative relationship between the GDP growth and the price shocks of oil palm. The positive relationship the GDP growth and the price shock of rubber.

According to the results of this particular study, it can conclude that Malaysia is an agriculture

resource dependent country. This dependency will cause the economy of the country in worst implication since the price of oil palm and rubber tends to be volatile. Therefore, policy makers have to improve the present economic policy and put more effort on expanding the wellspring of income of the country. There is one suggestion which concentrate more spending plans on reinforcing other fields such as to be associated in advanced investments in human and physical capital as recommended by [22] Badeeb et al. (2016). This research also can help augmented empirical research for the future researchers as a reference about the effects of price shocks of others commodities to the country's economy.

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