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Palm oil and Economic growth in Malaysia

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ABSTRACT

The fundamental objective of the study is to estimate the relationship between palm oil and Malaysia's economic development. Time series data over the years of 1990 to 2019 is used for the analysis of the data. Johnson Co-integration analysis and Granger Causality Test are applied to get the results. Outcomes of the Bi-Variant Co-integration analysis show that bi-variant co-integration relation exist between the variable PO TO in the long run. A finding of Pair wise Granger Causality Tests reveals that bi-directional Granger causality is present between the Gross Domestic Product (GDP) and palm oil (PO), LF and GDP, TO and PO. The uni-directional relationship exists between the PO and GDP, DI and PO, LF and PO, LF and DI, LF and TO. Research suggest that exports are a crucial factor in fostering economic development. It is the reason for the development of labour and capital in the world, but also for the expansion of economic growth.

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1 Introduction:

The origin of palm oil is West Africa. The British brought it to Malaysia in 1870's to develop the agriculture sector. Increased investment caused the increase in employment opportunities which raised the production of oil averaged to the world's production. Its superior traits and price competitiveness are the main factors making the oil more attractive to the importers. Malaysia has become one of the biggest producers and exporters in the world. It has given its share of almost 50% in the world's production of palm oil since 2002. Malaysia has a significant role in shaping the demand of palm oil in the world. Almost 60% of Malaysian production of palm oil is owned by private firms. Palm oil industry is an earmark of Malaysia in the way of becoming an industrialized nation (Vision 2020). The palm oil price depends on its level of stock and consumption. The use of palm oil in the world is higher than that of Malaysia as some of other countries give favour to keep the larger stocks (Mielke, 1991). The industrialised countries keep the larger stocks of agricultural commodities to bulwark the higher prices (Sarasorro and Gboroton, 1988). The palm oil price has been affected by the availability of its substitutes like Soybean oil. Soybean oil has a significant impact on palm oil prices in the food market since it has identical applications (Rehman *et al.*, 2007). It was suggested to Malaysian Government to decrease the dependence on the oil industry so that, curse of lower resources could be avoided. The government of Malaysia has considered a good step and reduced the oil dependency up to 22% in the period of six years (2012-2017). A former Prime Minister of Malaysia Dato Seri Najib Abdul Razak pointed

out in his speech in April 2015, one USD drop in oil price causes the loss of 450million ringgit in exports. This declaration indicates that Malaysia still needs to reduce the oil dependency to avoid resource curse.
Palm oil productions give as good base for structural development and undoubtedly, it has played a vital role in the development of Malaysia. On the contrary, it is also a fact that most of the production is owned by large companies (Azhar, 2017). The small farmers are still deprived. A strong need exists to empower the small farmers by intriguing the holistic certification scheme. It will help in the preservation of biodiversity (Saadun *et al.* 2018).

Research Questions.

- What is the impact of palm oil export on economic growth of Malaysia?
- What is the relationship between domestic investment and economic growth?
- What is the effect of trade openness on economic growth?

Research Objectives.

- To know the impact of palm oil export on economic growth of Malaysia.
- To know the relationship between domestic investment and economic growth.
- To know the effect of trade openness on economic growth.

2 Literature Reviews

Khin et al (2020) examines the impact of Palm Oil and Rubber price shock on GDP growth of Malaysia by using secondary time series data from the period of 1983 to 2017. The results of Autoregressive Distributed Lag (ARDL) show that price shock of palm oil shows negative impact on the GDP growth of Malaysia in both long run and short run, Although the rubber price shock has a positive effect in the long run and a positive and marginal impact in the short run. Irmayani et al (2019) investigate the effects of the price, marketing margins and palm oil plantations of global crude palm oil (CPO) on short-term and long-term environmental degradation. The study used monthly secondary data for the period of 2008 to 2017. The study used different econometrics model such as Johansson Co-integration test, Pair wise Granger Causality Test and Vector Error Correction for data analysis and Augmented Dickey Fuller (ADF), Phillips – Perron (PP) and Kwiatkowski – Philips – Schmidt Shin (KPSS) are used to check the stationary of the data. The study used secondary data for different variables like Environment Quality Index, Global Crude Palm Oil Price, Marketing Margins and Palm Oil Plantations. The outcome shows that global Crude Palm Oil (CPO) price, marketing margins, and palm oil plantations have long-term relationships with the environmental quality index. Global Crude Palm Oil (CPO) prices, on the other hand, have a major positive impact on the environmental quality index. The scale of the palm oil plantation and marketing margins, whereas, have a major negative impact on Indonesia's environmental quality index. Muchtar et al (2019) focuses financial development and performance of palm oil industry in Malaysia for the period from 1981 to 2017, through using annual time series data. ARDL 's findings indicate that financial growth has a positive long-term and short-term effect on the success of the palm oil industry. Charoenrat et al (2019) examined that if Export-led Growth Hypothesis Hold for Myanmar? In this paper, utilizing annual data covering the period from 1981 to 2015, they challenged the causality of export expansion and economic growth in Myanmar. The Johansen co-integration test and the Granger causality test for TodaYamamoto growth to evaluate the hypothesis of export-led growth in Myanmar. In Myanmar, the findings support the export-led development hypothesis. This result is very relevant since it demonstrates that exports are a key factor in fostering economic development.

Bentivoglio and Finco (2018) analyzed the factors affecting the palm oil boom in Indonesia by using annual time series data analysis from the period of 1987 to 2017. The study used Co-integration Technique, Error Correction Model and Granger Causality Test for the findings. Augmented Dickey Fuller (ADF) is also used to check the stationary of the data in this study. This finding shows that the price of soybean oil, the region extracted for the production of palm oil in Malaysia, and the consumption of palm oil have a positive and important effect on the production of Indonesian palm oil. Hartano et al (2018) analyzed the rate of Crude Palm Oil (CPO) in Indonesia to India by applying data from the annual time series for the 1990 to 2015 period. The study used Constant Market share analysis to measure the growth rate. The study also used Error Correction Model (ECM) and Co-integrated test with Engle – Granger test. The study also used to Augmented Dickey Fuller (ADF) method to check the stationary of the data. The findings demonstrate that the growth rate of exports of Indonesian CPOs to India fluctuates and that the volume of exports of Indonesian CPOs to India is negatively and significantly affected by the long-term and short-term export duties of Indonesian CPOs. Murshidi and Aralas (2017) examine the relationship between the price shock of crude oil, crude palm oil and rubber, and Malaysia's growth rate of gross domestic product in the short and long term. From 2000 to 2016, the analysis utilised quarterly time series results. For the stationary data and Autoregressive Distributed Lag (ARDL) approach, the research used the Augmented Dickey Fuller (ADF) unit root test, Error Correction Model for data analysis. The findings show that oil and palm oil price shocks impact " the growth of the gross domestic product both in the long and short term.' Oil price shocks have a negative impact on GDP growth in the long term, and both positively and negatively in the short term. Palm oil price shocks, on the other hand, have a positive effect on gross domestic product growth, both in the long and short term. The findings also suggest that, in both the short and long term, there is no statistically significant association between rubber price shocks and gross domestic product growth. Chaiboonsri et al (2012) examines the factors that affecting palm oil and crude oil prices by using extreme value approach in Malaysia. The study used time series data of Palm Oil Price, the Soybean Oil Price and the Crude Oil Price in local currencies from July 1988 to January 2012. The study used Bivariate Extreme Value, Bivariate Block Maxima and Bivariate Threshold Approach was used to examine the extreme dependence between the growth rate of palm oil and soybean oil prices, and the growth rate of palm oil and crude oil prices. The results show that the growth rate of the prices of palm oil and soybean oil depends somewhat on extremes, however the growth rate of the prices of palm oil and crude oil depends relatively weakly or even on extremes of independence. Naziman et al (2012) investigates the productivity of the prices of Malaysian Crude Palm Oil utilizing data from the annual time series for the period 1998 to 2010. The study used Johansen – Juselius Co – Integration Test, Granger Causality and Vector Error Correction Model (VECM) for the analysis and Augmented Dickey Fuller (ADF) unit root test to check the stationary of the data. The multivariate Johansen test provides some evidence for spot prices and co-integrated futures prices. This means that it is possible to quickly dismiss the market efficiency hypothesis. The Error-Correction Model (ECM) also demonstrates that spot and future prices have a complex relationship.

3 Data and Methodology

The study uses the time series data during the 1990 to 2019 and source of data is World Bank and index mandi for Malaysia. To check the stationary of all the variables in the model, the unit root test is applied. Augment Dickey Fuller test is used to detect whether all the variables are stationary or not, and to control the variables' orders of integration. The mathematical model of the study is,

GDP=f (PO, DI, TO, INF, LF)

The econometric model is,

$GDP_t = \alpha_0 + \alpha_1 PO_t + \alpha_2 DI_t + \alpha_3 TO_t + \alpha_4 INF_t + \alpha_5 LF_t + \varepsilon$ $\ln GDP_t =$

$\alpha_0 + \alpha_1 \ln PO_t + \alpha_2 \ln DI_t + \alpha_3 \ln TO_t + \alpha_4 \ln INF_t + \alpha_5 \ln LF_t + \varepsilon$

Where,

GDP = Gross Domestic Product

POE = Palm oil export

DI= Domestic Investment

TO = Trade openness

INF= Inflation LF

= Labour Force ε

=Error Term t

=Time Series

4 Results and Discussion Descriptive Statistics

Descriptive statistics describe the basic data structure that indicate measurable descriptions in the suitable technique and give the abstract of the data. A random variable is measured by the Mean median and mode in the central tendency (Gujarati, 2004).

Table: 1 Descriptive Statistics

	GDP	PO	DI	TO	INF	LF
Mean	135996.2	12357.03	20465.34	17182.63	8.367535	44.66677
Median	97977.77	13586	14675.13	15350.08	7.921084	43.22
Maximum	312570.1	18524	46336.94	30699.24	20.28612	61.71
Minimum	40010.42	5433	6921.704	6216.943	2.529328	29.04
Std. Dev.	88702.78	4577.514	12073.64	8253.838	4.162791	10.83404
Skewness	0.658295	-0.2231	0.634877	0.322365	0.637442	-0.02788
Kurtosis	2.012828	1.493913	2.142859	1.562377	3.417818	1.463439
Jarque-Bera	3.272069	2.98144	2.835914	2.999612	2.17488	2.856654
Probability	0.194751	0.22521	0.242208	0.223173	0.337078	0.23971
Sum	3943890	358354	593494.8	498296.3	242.6585	1295.336
Sum Sq. Dev.	2.20E+11	5.87E+08	4.08E+09	1.91E+09	485.2072	3286.538
Observations	29	29	29	29	29	29

According to the findings of the descriptive statistics 29 observations are used in the study. The dispersion of data is measured by the standard deviation. All the variables (GDP, DI, TO, INF, LF,) in the model are positively skewed and indicate, distribution of the data is progressive, and PO shows that data distribution is not progressively skewed. Kurtosis standard value is 3; Kurtosis values of INF are more than 3 that indicate,

data distribution is Leptokurtic. So, the Kurtosis value of GDP PO TO DI and LF is less than 3 that indicate, data distribution is Platokurtic.

Unit Root Analysis

This test is applied to check the stationary (or non-stationary) of the variables. Two tests of unit root are used mostly Augmented Dickey Fuller (ADF) and Philip Peron (PP) Tests. But this study used the ADF test to check the stationary of the variables.

Table: 2 Unit Root Test

	ADF (Level)		ADF (1st Difference)	
Indicators	t-Stat	Prob.*	t-Stat	Prob.*
GDP	-1.03917	0.9217	-5.46538	0.0007
PO	-1.08212	0.9144	-478485	0.0036
DI	-1.00814	0.9267	-4.54752	0.0062
TO	-1.61705	0.7602	-4.53851	0.0064
INF	-2.28076	0.43	-6.46784	0.0001
LF	-1.1248	0.9058	-6.02862	0.0002

Source: Software E-View 9.0

Note: Significance level is 5%.

Results of the Augmented Dickey Fuller (ADF) predict that all the variables GDP, PO, DI, TO, INF, and LF are stationary at first difference.

Johnson Co-Integration Analysis

Johnson Co-Integration Analysis is used to check the long-run co integration among the variables.

1. Table: 3 Trace Statistics

Unrestricted Co integration Rank Test (Trace)					
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.	
None	0.790368	138.4336	95.75366	0.0000	Co-Integrated
At most 1	0.759713	96.24875	69.81889	0.0001	Co-Integrated
At most 2	0.688625	57.74886	47.85613	0.0045	Co-Integrated
At most 3	0.434146	26.24642	29.79707	0.1215	No Co-Integrated
At most 4	0.254266	10.87211	15.49471	0.2195	No Co-Integrated
At most 5	0.103524	2.950675	3.841466	0.0858	Co-Integrated

Source: Software E-View 9.0

level is 1%, 5%, 10% a

Table: 4 Max Eigen value

Unrestricted Co integration Rank Test (Maximum Eigen value)					
Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.	
None	0.790368	42.18482	40.07757	0.0285	Co-Integrated
At most 1	0.759713	38.4999	33.87687	0.0131	Co-Integrated
At most 2	0.688625	31.50243	27.58434	0.0149	Co-Integrated
At most 3	0.434146	15.37431	21.13162	0.2635	No Co-Integrated
At most 4	0.254266	7.921433	14.2646	0.3867	No Co-Integrated
At most 5	0.103524	2.950675	3.841466	0.0858	Co-Integrated

Source: Software E-View 9.0

Note: Significance level is 1%, 5%, 10% and '*', '**', '***' respectively

The outcome of multivariate co-integration analysis is presented in above tables for all the series. The results display that three series are co-integrated in long run in the both Trace Statistics and Max Eigen Value.

Bi-Variant Co-Integration Analysis

In Bi-Variant Co-Integration Analysis, relation between the two variables is checked for the long-run.

Table: 5 Bi-Variant Co-Integration Analyses

Variables	**Eigen value**	**Trace Statistic**	**0.05 Critical Value**	
GDP PO	0.350461	13.60394	15.49471	No Co-integrated

	0.069801	1.953632	3.841466	
GDP DI	0.342865	14.49877	15.49471	No Co-integrated
	0.110526	3.162388	3.841466	
GDP TO	0.300295	10.64699	15.49471	No Co-integrated
	0.036552	1.005394	3.841466	
GDP INF	0.210294	9.310938	15.49471	No Co-integrated
	0.10305	2.936395	3.841466	
GDP LF	0.324733	14.07586	15.49471	No Co-integrated
	0.120746	3.474395	3.841466	
PO DI	0.125763	3.716618	15.49471	No Co-integrated
	0.003244	0.087722	3.841466	
PO TO	0.386508	15.60364	15.49471	Co-Integrated
	0.085451	2.411749	3.841466	
PO INF	0.126936	5.118296	15.49471	No Co-integrated
	0.052397	1.453138	3.841466	
PO LF	0.168846	6.883786	15.49471	No Co-integrated
	0.06762	1.890388	3.841466	
DI TO	0.16313	5.720947	15.49471	No Co-integrated
	0.033235	0.912606	3.841466	
DI INF	0.239325	8.38817	15.49471	No Co-integrated
	0.036443	1.002341	3.841466	
DI LF	0.11899	4.77833	15.49471	No Co-integrated
	0.049045	1.357801	3.841466	
TO INF	0.1633	5.295218	15.49471	No Co-integrated
	0.017671	0.481383	3.841466	
TO LF	0.320975	10.76042	15.49471	No Co-integrated
	0.011371	0.308778	3.841466	
INF LF	0.121814	3.656891	15.49471	No Co-integrated
	0.005529	0.14969	3.841466	

If the trace statistics is greater than the critical value then bi-variant Co-integration exist and also show that long run relationship present between the two variables. Outcomes of the table show that bi-variant cointegration relation exist between PO TO and No Co-integrated relation exit between all the other variables GDP PO, GDP DI, GDP TO, GDP INF, GDP LF, PO DI, PO TO, PO INF, PO LF, DI TO, DI INF, DO LF, TO INF, TO LF, and INF LF in the long run.

Table 6: Pair wise Granger Causality Tests

Null Hypothesis:	Observations	F-Statistics	Prob.
PO does not Granger Cause GDP	26	4.88388	0.0111
GDP does not Granger Cause PO		1.40583	0.2719
DI does not Granger Cause GDP	26	0.34352	0.7942
GDP does not Granger Cause DI		2.34506	0.1052
TO does not Granger Cause GDP	26	1.07747	0.3823
GDP does not Granger Cause TO		2.26243	0.1141
INF does not Granger Cause GDP	26	0.20983	0.8883
GDP does not Granger Cause INF		1.83292	0.1754
LF does not Granger Cause GDP	26	2.58608	0.0833
GDP does not Granger Cause LF		2.55503	0.0858
DI does not Granger Cause PO	26	0.33489	0.8003
PO does not Granger Cause DI		5.21385	0.0085
TO does not Granger Cause PO	26	3.26551	0.0441
PO does not Granger Cause TO		3.81991	0.0269
INF does not Granger Cause PO	26	0.37604	0.7713
PO does not Granger Cause INF		0.42695	0.736
LF does not Granger Cause PO	26	3.06196	0.0531
PO does not Granger Cause LF		1.27068	0.3128
TO does not Granger Cause DI	26	0.74395	0.5391
DI does not Granger Cause TO		2.1864	0.123
INF does not Granger Cause DI	26	1.53853	0.237
DI does not Granger Cause INF		1.22713	0.3273
LF does not Granger Cause DI	26	2.26766	0.1135
DI does not Granger Cause LF		3.34954	0.0408
INF does not Granger Cause TO	26	0.18843	0.903
TO does not Granger Cause INF		0.26379	0.8506
LF does not Granger Cause TO	26	3.62596	0.0319
TO does not Granger Cause LF		1.17137	0.3468
LF does not Granger Cause INF	26	0.04514	0.9869
INF does not Granger Cause LF		1.15129	0.3541

Source: Software E-View 9.0

Note: Significance level is 1%, 5%, 10%.

The first column shows the null hypothesis for possible rejection at different significance level that is 1%, 5%, 10%. But second column displays the observations that are 26; third column F statistic and fourth column show probability value. PO does not Granger causality GDP with value of probability 0.0111 show PO does Granger causality GDP. So this show uni-directional Granger causality between the Gross Domestic Product (GDP) and Palm oil (PO). LF does not Granger Cause GDP and GDP does not Granger Cause LF with values

of probability 0.0833 and 0.0858 respectively, predict LF does Granger Cause GDP and GDP does Granger Cause LF. This predicts the bi-directional Granger causality between the LF and GDP in the economy of Malaysia. DI does not Granger causality PO with value of probability 0.0085 show PO does Granger causality DI. So this show uni-directional Granger causality between the Domestic Investment and Palm oil (PO). TO does not Granger Cause PO and PO does not Granger Cause TO with values of probability 0.0441 and 0.0269 respectively, shows TO does Granger Cause PO and PO does Granger Cause TO. This predicts the bidirectional Granger causality between the TO and PO in the economy of Malaysia. LF does not Granger Cause PO with value of probability 0.0531; show LF does Granger Cause PO. It has uni-directional Granger causality between LF and PO. LF does not Granger Cause DI with value of probability 0.0408, means LF does Granger Cause DI. It shows uni-directional Granger causality between the LF and DI. LF does not Granger Cause TO with value of probability 0.0319, means LF does Granger Cause TO. It shows uni-directional Granger csausality between the LF and TO.

5 Conclusion

The basic aim of the study is to check relationship between the palm oil and economic growth in Malaysia. Time series data over the years of 1990 to 2019 is used for the analysis of the data. Johnson Co-integration analysis and Granger Causality Test are applied to get the results. Outcomes of the Bi-Variant Co-integration analysis show that bi-variant co-integration relation not exist between the variables GDP PO, GDP DI, GDP TO, GDP INF, GDP LF, PO DI, PO INF, PO LF, DI TO, DI INF, DO LF, TO INF, TO LF, and INF LF and only exit between PO TO in the long run. A finding of Pair wise Granger Causality Tests reveals that bidirectional Granger causality is present between the Gross Domestic Product (GDP) and palm oil (PO). The uni-directional relationship exists between the PO and GDP, DI and PO. Bi-directional Granger causality between the LF and GDP, TO and PO exist in the economy of Malaysia. Uni-directional Granger causality is present between LF and PO, and LF and DI, LF and TO. Study suggests that exports are a main factor to promote economic growth. It became the cause to generated the amounts of labour and capital within the country but also to expanding economic growth. Private companies are more profitable than government sectors and size has negative relation to performance.

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