Analyses of the Determinants of Palm Oil Production in Nigeria (1971-2010)

By

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ABSTRACT

This study analyses the determinants of palm oil in Nigeria between 1971 and 2010. Palm oil productivity measured by palm oil gross domestic product (PGDP) was specified as a function of factors such as exchange rate, crude oil price, palm oil price and structural adjustment programme (SAP). Quantitative estimates, based on Augumented-Dickey Fuller unit root test, co-integration and error correction specification, indicate that the exchange rate and palm oil price are the major determinants of agricultural productivity in the long-run while price of crude oil is the most important determinant of palm oil productivity in the short-run. The result further shows that the error correction mechanism (ECM) indicated a feedback of about 99.8% of the previous year’s disequilibrium from long-run domestic palm oil production. It is concluded that the price of crude oil indeed has a negative effect on palm oil productivity in Nigeria. It also shows that only a good combination of goods exchange rate and a stable palm oil price can bring about the much needed change in the Nigeria palm oil sector.

Keywords: palm oil productivity, exchange rate, crude oil price, gross domestic product, structural adjustment programme (SAP).

1. INTRODUCTION

The Oil palm tree (*Elaeis guineensis*) belongs to the family palmae having 225 genera with over 2600 species is one of the most important economic crops in Nigeria. It was discovered thousands of years back in western Africa as a result of European merchants who traded with West Africa and purchased palm oil occasionally for use in Europe. According to World Rain-forest Movement (2001), oil palm is indigenous to the Nigerian coastal plain though it has migrated in-land as a staple crop. The crops’ cultivation serves as a means of livelihood for many rural families indeed it is in the farming culture of millions of people in the country. The principal product of oil palm is the palm fruit which is processed to obtain three main commercial products which include palm oil, palm kernel oil and palm kernel cake. The use of palm oil varies (Adegbola et al 1979) it could be used for cooking, making soap, plating metals and lamp oil.

The Nigerian oil palm belt covers twenty-four states (Osun, Oyo, Ekiti, Akwa Ibom, Abia, Rivers, Edo, Imo, Ondo, Bayelsa, Cross river and Delta). Within the oil palm belt in Nigeria, 80% of production comes from dispersed smallholders who harvest semi-wild plants and use manual processing techniques. Several million shareholders are spread over an estimate area ranging from 1.65 million hectares to 2.4 million hectares and to a maximum of 3 million hectares. The estimate for oil palm plantations in Nigeria ranges from 169,000 hectares (72,000 ha of estate plantations and 97,000 ha of smallholders plantations) to 360,000 hectares of plantations. Many of these plantations mentioned above are the results of past attempts by the Nigerian government to establish large scale plantations, most of which resulted in complete failures because of adequate attention not being paid to it. Examples of such failed efforts are the Cross river State project in 60’s and of the European Union-funded “Oil palm Belt Rural Development Programme” in the 90’s.

Palm oil accounts for 34 percent of the world’s annual vegetable oil and 63 percent of the global exports (REF). Nigeria is currently the third largest producer of palm oil in the world after Indonesia and Malaysia; however, it remains a net importer. The Nigerian experience of palm oil development provides a clear example of how palm oil, as a result of its high yield and low production costs, is a highly efficient means of alleviating poverty.

Agricultural export was the mainstay of the Nigerian economy prior to the discovery, exploitation and exportation of crude oil which led to total dependence of the country on it for generation of revenue for economic growth and sustenance, before the oil boom in the 1970s, agricultural products accounted and contributed majorly to the export sector and the products were mainly (Oil palm, Cocoa, Rubber, Cotton etc) it fell to 35% of the GDP from an average of 72% between 1955 and 1969.
Agriculture has been the most important single activity in Nigeria economy with about 70 percent of the total working population engaged in it (Abolagba et al, 2010). Nigeria has also been ranked very high in the production and exportation of some major crops in the world in the 1940s and 1950s. It has been said that agricultural products tend to have the characteristics of a low price elasticity of demand while mineral export commodities are known to have high price elasticity of demand.

Fluctuation in commodity price poses a real challenge to the economies of developed countries for instance United States and Japan and other African countries where Nigeria is no exception. Sardosty,(1999) and Hamilton, (1983) indicates that commodity price especially energy prices exerts significant effect on a country’s economy. This is true in the case of palm oil prices and crude oil prices but it should be considered importantly when comparing palm oil and crude oil for exports that crude oil is an exhaustible asset which makes it unreliable and unpredictable for sustenance of the development of the country’s economy. Also, there is need to penetrate dynamic markets in the developed and emerging economies with traditional and nontraditional agricultural crops which may provide the best avenue to attract high and accelerated development in the Nigerian economy.

The export of primary product particularly agricultural productions account for a large proportion of Nigeria’s non-oil export earnings. According to Thirwall (1999), the demand for developing country traditional exports is inelastic relative to the demand for industrial goods internationally traded cash crops in Nigeria such as palm produce, cocoa, rubber, timber and cotton. The overall success of any export promotion strategy is to increase and sustain growth in agricultural exports growth. According to Gbetnkom and Khan (2002), there are two main schools of thoughts explaining the decline in agricultural exports one stresses factors that are external to the individual country, the slow volume of growth, world primary commodity market and the deteriorating terms of trade. The other line of thought emphasizes factors that are internal to the country that is domestic policies that have affected export supply adversely. The consideration in this study will go in line with the both schools of thought.

It is well known fact that Nigeria has a comparative advantage in production of agricultural commodity (raw materials, primary growth) with its level of technology. It is important to consider the non-oil diversification strategies by measuring ways through which growth in agricultural output can be stimulated having all necessities which will stimulate export. Agriculture as a sector plays an overall role in reformation of Nigeria’s economy.

This research work will therefore answer the following questions:

• What are the trends in production output and producer prices of palm oil?
• What is the effect of crude oil price on palm oil production and exports in Nigeria?

1.1 Hypothesis of the study

The following hypothesis will be formulated for the research

HO: crude oil has no significant effect on palm oil production in Nigeria

2. METHODS AND MATERIAL

2.1 Study Area

Nigeria is located on the southern coast of West Africa between latitude 3.5°N and 14.5°N longitude 3°E and 14°E with Benin border to the West and Chad to the North and Cameroun to the East with landed areas of over 923,773 square kilometer and is extensive suitable for cultivation of almost all types of food crops out of which oil palm is part of. The specific location is of advantage in terms of environmental diversity, culture, cultivation and human practices, thus the country is blessed with favourable climatic conditions which is good for almost all the food crops especially oil palm. Nigeria has five main vegetation belts; these are the Mangrove forest, Savannah grassland, Equitorial forest, Semi desert, Guinean savannah. The country has a wide range of climatic conditions but as a tropical country, it is generally hot and humid. We have two prominent seasons; they are dry and wet seasons. The wet season falls between April-November and the prevailing wind flows from the southwest. The dry season is between December-March when harmattan blows from the south eastern part of the country thereby giving Nigeria diversity which is reflected in the large quantity of coca produced.

2.2 Data source and collection methods

The data used is secondary data which include time series micro level data spanning from 1971-2010. The data was sourced from various issues of Central Bank of Nigeria (CBN) statistical bulletin and the statistical database of the Food and Agricultural Organizations of the United Nations.
The features of the data include:

1. Palm oil price.
2. Palm oil production and export.
3. Crude oil price
4. Exchange rate.

2.3 Analytical Procedure and model specification

2.3.1 Co-integration analysis: This study applied co-integration error correction modeling to examine the effect of crude oil prices on palm oil export and production in Nigeria. As a first step, Error Correction Model (ECM) ascertains the stationarity or otherwise of the time series data. Co-integration and error correction modeling thereafter is used to examine the determinants of palm oil production in Nigeria.

2.3.2 Stationarity test: This study applied co-integration and error correction modeling to examine the effect of crude oil prices on palm oil production in Nigeria. As a first step, ECM ascertains the stationarity or otherwise of the time series data. A non-stationary series requires differencing to become stationary. As such, there is need to assess the order of integration of both the dependent and independent variables in the model under analysis. The order of integration ascertains the number of times a variable will be differentiated to arrive at stationarity. A stationary series is I(0) series while non-stationary series are I(1). It is also possible for non-stationary series to be of order 2, that is I(2), or even of a higher order. \( X_t \) is integrated of order \( D \) or \( X_t \sim I(D) \), if it is differentiated \( D \) times to achieve stationarity (Dickey and Fuller, 1981).

Engle and Granger (1987) provided appropriate tests for stationarity of individual series. Specifically the test procedure includes the estimation of the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) statistics. The DF and ADF are tests for the null hypothesis that the variable of interest is non-stationary. Thus,

\[ H_0: \text{The variables are not stationary at their levels, i.e. } I(1) \]
\[ H_1: \text{The variables are stationary at their levels, i.e. } I(0) \]

The test procedure is usually indicated in the following type of equation:

For DF test  
\[ \Delta X_t = \alpha_0 + \delta X_{t-1} + e_t \label{eq:df} \]

For ADF test,  
\[ \Delta X_t = \alpha_0 + \delta X_{t-1} + \sum_{i=1}^{k} \Delta X_{t-1} + e_t \label{eq:adf} \]

\( H_0 \) is rejected if the t-statistic on \( \delta \) is negative and statistically significant when compared to appropriate critical values established for stationarity tests. In order generate an error correction model, there is the need to examine the existence of any meaningful long-run relationship between variables (i.e co-integration).

2.3.3 Co-integration and Error Correction Analysis: To test for co-integration, two main approaches have been developed: one involves the estimation of a static model where all variables enter in levels according to Engle and Granger, 1987, the other estimation of an error correction model is the Johansen procedure (Johansen, 1988). The Johansen procedure is to be preferred over the Engle-Granger approach for two major reasons. First, in the multivariate case considered here, it avoids the identification problems one may encounter with the Engle-Granger approach if there is more than one co-integrating vector. Second, the Dickey-Fuller test employed to test for co-integration in Engle-Granger regressions often rejects the existence of equilibrium relationships (Kremers et al., 1992). Johansen (1988) considers a simple case where \( Y_t \) is integrated of order 1, such that the first difference of \( Y_t \) is stationary. The procedure developed by Johansen (1988) which includes the identification of rank of the \( n \times n \) matrix \( Y_t \) in the specification as given below.

\[ \Delta Y_t = \mu + \pi Y_{t-k} + \sum_{i=1}^{k-1} \tau_i \Delta Y_{t-1} + \mu_t \label{eq:johansen} \]

Where \( Y_t \) is a column vector of the \( n \) variables, \( \pi \) and are coefficient matrices, \( \Delta \) is difference operator, \( K \) denotes the lag length and \( \mu \) is a constant. The \( \pi \) matrix conveys information about the long-run relationship between the \( Y_t \) variables, and the rank of \( \pi \) is the number of linearity independent and stationary linear combination of variables studied. Thus, testing for cointegration involves testing for the rank of \( \pi \) matrix \( r \) by examining whether the eigen values of \( \pi \) are significantly different from zero. The maximum likelihood approach enables testing the hypothesis of \( r \) cointegrating relations among the elements of \( Y_t \). Hence the null hypothesis of no cointegrating relations (\( r = 0 \)) implies \( \pi = 0 \).
In order to obtain the optimal VEC model we applied the minimum AIC-criterion. To determine the number of cointegrating equations, the Johansen maximum likelihood method provides both trace and maximum eigen value statistics. One important regarding these two tests is that both tests have no standard distributions under the null hypothesis. The order of \( r \) is determined by using the likelihood ratio (LR) trace test statistic suggested by Johansen (1988).

\[
\lambda_{\text{trace}}(r) = -T \sum_{i=r+1}^{\pi} \ln(1 - \hat{\lambda}_i)
\]

The maximum eigen value LR test statistic as suggested by Johansen is

\[
\lambda_{\text{max}}(r, r + -1) = -T(1 - \hat{\lambda}_r)
\]

where \( r \) is the number of cointegrating vector, \( \hat{\lambda}_r \) is the estimate values of the characteristics roots obtained from the estimated \( \pi \) matrix and \( T \) is the number of observations. When the trace statistic \( t \) and the maximum eigen value statistic \( \lambda \) are greater than Osterwald-Lenum (1992) critical values, the null hypothesis of \( r \) cointegrating vectors against the alternative of \( r + 1 \) vectors is rejected.

Having established the extent and form of co-integrating relationships between the variables of the model, an ECM can then be estimated. First, an over-parameterized ECM was estimated and this specification established lag lengths on all variables. This was specified in order not to lose information of the variables by lagging all the variables once. At this stage, the over-parameterized model was found to be difficult to interpret in any meaningful way but could still be explained to some extent based on the probability values. This then led to the simplification of the model into a more interpretable characterization of the data. That is, a parsimonious ECM was estimated.

Parsimony helped to ensure data admissibility and proper clarification on whether the model was consistent with theory, and with the estimation, non-significant variables were dropped from the model. The overall validity of the reduction sequence sought to minimize the goodness of fit of the model with minimum number of variables. The decision rule for choosing which of the two models had the best fit (i.e whether over-parameterized or parsimonious model) is indicated in the Schwarz criterion. The Schwarz information criterion provides a guide to parsimonious reductions and defined as:

\[
S^c = \ln \delta^2 + k \ln t \quad \text{.........(4)}
\]

Where \( \delta \) is the maximum likelihood estimate (MLE) of \( \delta \), \( k \) is the lag length and \( t \) is the sample size/number of observations. Thus, a fall in Schwarz criterion is an indication of model parsimony; that is, the model is significant with theory.

2.4 Model Specification

The hypothesized structural relationship for the study is specified as follows:

\[
LQ = \beta_o + \beta_1LP_e + \beta_2LEX_t + \beta_4LP_o + \beta_5SAP_c + T + \mu \quad \text{.................(5)}
\]

Where:

- \( LQ = \) Palm oil output
- \( LP_e = \) Real World market Price for palm oil
- \( LEX_t = \) Real exchange rate
- \( LP_o = \) Crude oil price
- \( SAP = \) Structural Adjustment Programme. This is a dummy variable which takes on 0 for period before adoption of SAP and 1 for period after the adoption of SAP in Nigeria.
- \( T = \) Time trend. The variable \( T \), which represents technology, was modeled with the series as represented by the time variable serving as a proxy for the impact of technology change on output, i.e to capture technical progress, productivity, high-yielding varieties, etc
- \( \mu = \) Other unobserved variables

The estimated linear function of the above specification was found to give the lead equation, on which the discussions were made.

2.4.1 The Error Correction Model

First, the variables, in equation (5) were tested for unit root using the ADF technique while Johansen (1988) reduced – rank test for co-integration was used to test for co integrations relationships between selected set of variables. The error correction model (ECMs) estimated are shown in (7) below. ECM in (7) represents the short-run behavior of cocoa yield response in (7) while equation (6) represents the long – run static equation. The parameter \( \lambda \), which is negative, in general measures the speed of adjustment towards the long run equilibrium relationship between the
variables in (7). The optimum lag lengths to be included in equations (7) were determined based on Akaike Information Criterion (AIC).

**Static long run model for palm oil**

\[ LQ = \beta_0 + \beta_1 LP_t + \beta_2 LEX_t + \beta_4 LP_0 + \beta_5 SAP_c + T + \mu \]  
\[ \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (6) \]

Error correction model (ECM) for the Palm oil production model is also given as equation (7)

\[ \Delta LQ = \gamma_0 + \sum_{i=1}^{I_1} \gamma_1 \Delta LP_{t-i} + \sum_{i=1}^{I_2} \gamma_2 \Delta LEX_{(t-i)} + \sum_{i=1}^{I_3} \gamma_3 \Delta LP_{0(t-i)} + \sum_{i=1}^{I_4} \gamma_4 \Delta SAP_{(t-i)} + \mu_t - \lambda \Delta ECM \]  
\[ \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (7) \]

Where \( \Delta \) represents first differencing, \( \lambda \) measures the extent of correction of errors by adjusting in independent variable, \( \beta \) measures the long-run elasticities while \( Y \) measures the short-run elasticities. General – to – specific modeling technique of Henry and Ericsson (1991) is followed in selecting the preferred ECM. This procedure first estimate the ECM with different lag lengths for the difference terms and, then, simplify the representation by eliminating the lags with insignificant parameters.

3. RESULTS AND DISCUSSION

3.1 Unit Root Tests

The results of the unit root tests are shown in table 1 below. The null hypothesis of the presence of unit root (non-stationarity) was tested against the alternative hypothesis of the absence of a unit root (stationarity). All the variables tested contain unit root processes, and all became stationary after first differencing. Hence, the variables are integrated of order I (1). This established the suitability of the variables with order I (1) for use in co-integration.

3.2 Tests for Co-integration

The result of Johansen multivariate co-integration test between palm oil gross domestic product and selected variables is presented in table 2 below. The result shows the existence of co-integration relationship among selected variables. On application of the test, the results of the maximum-Eigen value statistics and trace statistics from the table 2 shows that there is at least 1 co-integration relation. This indicates that there exists a long-run relationship between most of the explanatory variables and palm oil gross domestic product (palm oil production) in Nigeria. Since co-integration has been established, the regression results were analysed and diagnosed.

**Short-run Dynamic Error Correction Modeling (ECM) of Palm oil productivity**

General to specific modeling procedure of Hendry and Ericsson, (1991) was followed in the modeling and selection of the preferred dynamic short-run error correction mode (ECM). This procedure first estimates the ECM with different lag lengths for the difference terms and then, simplifies the representation by eliminating the lags with insignificant parameters. However, only the simplified version of the short-run dynamic ECM was reported in this study.

3.4 Determinants of Palm oil Production in Nigeria

The solved static long-run equation for palm oil productivity in Nigeria as well as its short-run equation is given in table 3 below. The \( R^2 \) value of 0.503 for the ECM in table 3 shows that the overall goodness of fit of the ECM is satisfactory. This means that only 50% of the variation in palm oil gross domestic product is explained by the explanatory variables, the remaining 50% is inherent in error term or white noise. However, a number of other diagnostic were also carried out in order to test the validity of the estimates and their suitability for policy discussion. The Autoregressive Conditional Heteroscedasticity (ARCH) test for testing heteroscedasticity in the error process in the model has an F-statistic of 2.926 which is statistically insignificant. This attests to the absence of heteroscedasticity in the model.

The Jacque- Bera \( \chi^2 \) - statistic of 6.681 for the normality in the distribution in the error process shows that the error process is normally distributed. From the battery of diagnostic tests presented and discussed above, this
study concludes that the model is well estimated and that the observed data fits the model specification adequately, thus the residuals are expected to be distributed as white noise and the coefficient valid for policy discussion.

It could be observed from the results in table 3 that the coefficient of error correction term (ECM) carries the expected negative sign and it is significant at 1%. The significance of the ECM supports co-integration and suggests the existence of long-run steady equilibrium between palm oil gross domestic product and other determining factors in the specified model. The coefficient of -0.998 indicates that the deviation of palm oil gross domestic product (PGDP) from the long-run equilibrium level is corrected by 99.8% in the current period.

The short-run coefficient of palm oil gross domestic product in the immediate past period is 0.243. This result is positive and it could be due to increase in farmer’s output of palm oil along with improved producer price. This will probably have a positive impact on agricultural production in the current year.

The exchange rate has a positive coefficient of 0.032 and 0.015 in the long and short-run respectively which are both significant at 5%. The elasticity values of exchange rate in both the short and long-run suggests that devaluation will decrease import of palm oil products, thereby encouraging local production which will subsequently increase palm oil production.

Palm oil price has a negative and significant value of -0.003 in the immediate past period which means that a unit decrease in price of palm oil will lead to a decrease in palm oil production in that year. In the current year however, palm oil price has positive values of 0.053 and 0.072 in the short and long-run respectively. The elasticity values of palm oil price in both the short and long-run suggests that increase in palm oil price will ultimately lead to increase in palm oil production.

In the short-run, crude oil price in the immediate past period has a positive coefficient of 0.006 and 0.008 in the short-run but a negative and significant value of -0.026 in the long-run. The elasticity value obtained for crude oil price in the short-run is in line with theoretical expectation since it is expected that as the world price of crude oil increase, the focus on agricultural production in developing country like Nigeria will further shift away. Therefore, it can be said that the price of crude oil determines the attitude or focus of government towards agricultural production in the country.

The coefficient of Structural Adjustment Programme (SAP) in the long-run is negative but insignificant with a value of -0.01. This means that SAP does not affect palm oil production. Therefore, SAP could be said not to be a major determining factor of palm oil production.

<p>| Table 1: Unit Root Test Results for Palm oil (Constant and Trend Included) |
|---------------------------------|-----------------|-----------------|---------------|--------------|</p>
<table>
<thead>
<tr>
<th>Variables</th>
<th>t-statistic (level)</th>
<th>t-statistics (1&lt;sup&gt;st&lt;/sup&gt; difference)</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQM</td>
<td>-2.083</td>
<td>-3.936*</td>
<td>1</td>
</tr>
<tr>
<td>LEX</td>
<td>-1.625</td>
<td>-3.192*</td>
<td>1</td>
</tr>
<tr>
<td>LPₒ</td>
<td>-3.289</td>
<td>-7.831**</td>
<td>1</td>
</tr>
<tr>
<td>SAP</td>
<td>-1.586</td>
<td>-5.979**</td>
<td>1</td>
</tr>
<tr>
<td>LPm</td>
<td>-1.252</td>
<td>-5.506**</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: Data Analysis, 2014*

** Indicates significance at 5%, * indicates significance at 10%**

| Table 2: Results of the Johansen’s maximum-Eigen value and Trace Statistics Co-integration test |
|-----------------------------------------------|-------------------------------|-----------------|---------------|--------------|
| Trace Statistical Test                        | Eigen-value Statistical test  |
| Test Statistics                              | Critical value                | Test statistics | Critical values |
| p= 0                                          | 92.4*                         | 87.3            | 42.41*        | 37.5         |
| p≤ 1                                          | 50.0                          | 63.0            | 24.13         | 31.5         |

*Source: Data Analysis, 2014*

* Numbers of values significant at 5%
Table 3: Static long-run and Short-run error correction model estimate for effect of crude oil price on palm oil production in Nigeria.

<table>
<thead>
<tr>
<th>Static long-run result</th>
<th>Short-run result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>Constant</td>
</tr>
<tr>
<td></td>
<td>15.038(190.120)</td>
</tr>
<tr>
<td>LEX</td>
<td>0.032(1.720)*</td>
</tr>
<tr>
<td></td>
<td>0.243 (1.313)</td>
</tr>
<tr>
<td>LP</td>
<td>0.072(14.33)**</td>
</tr>
<tr>
<td></td>
<td>0.015 (1.910)*</td>
</tr>
<tr>
<td>SAP</td>
<td>-0.01(-0.263)</td>
</tr>
<tr>
<td></td>
<td>-0.01(-2.314)**</td>
</tr>
<tr>
<td></td>
<td>∆LPmₒ (-1)</td>
</tr>
<tr>
<td></td>
<td>∆LPmₒ (-1)</td>
</tr>
<tr>
<td></td>
<td>∆LPₒ (-1)</td>
</tr>
<tr>
<td></td>
<td>∆LPₒ (-1)</td>
</tr>
<tr>
<td></td>
<td>ECM (-1)</td>
</tr>
<tr>
<td>R²</td>
<td>0.503</td>
</tr>
<tr>
<td>AR</td>
<td>2.303 (0.121)</td>
</tr>
<tr>
<td>F (2, 25)</td>
<td>2.926 (0.099)</td>
</tr>
<tr>
<td>ARCH (1, 25)</td>
<td>6.681 (0.0354)</td>
</tr>
</tbody>
</table>

Source: Data Analysis, 2014

4.0 SUMMARY, CONCLUSION AND RECOMMENDATION

4.1 Summary

The study analyzed the determinants of palm oil production in Nigeria using time series data. It also shows that in the long run, exchange rate (EX) and palm oil price (PM) determines the level of palm oil production. Though, the price of crude oil also determines the level of palm oil production, it is only significant in the short run.

The econometric estimates can reject the null hypothesis that the dispersion in beliefs of speculators that there is no significant relationship between the determinants of palm oil production in Nigeria. Both the Granger causality tests and the distributed lag models, which also include lagged regressors that measure the dispersion in beliefs of speculators, confirm moreover the role of speculation as a precursor to price movements. There is no doubt that the significant regression results only represent apparent correlations. In a complex market like crude oil market, with many different and partly difficult to quantify variables, there is however with regard to the modeling of estimation equations a trade-off between simple and more robust specifications on the other hand, a model that replicates the data-generating but is less robust and easily over fitted.

Palm oil gross domestic product showed an upward trend from 1971-2010. Though there was increase, the trend shows the country could do better for its population by producing more of these crops for local use and export. The results do not imply a reduction in the activities of palm oil and the dispersion in beliefs of palm oil production for the price of crude oil. Accordingly, a regulatory measure could be aimed at preventing the crops production in the future market from displaying in beliefs, measured via the difference between long and short contracts.

4.2 Conclusion

From the findings, it can be concluded that of all the determinants of palm oil production, exchange rate appears to be most significant of all. Also, crude oil causes a decline in the growth of agriculture as expected in theory.

4.3 Recommendation

From the above conclusion, the following recommendation is made for further consideration: Since it has been established that the export and dependence of the Nigerian economy on crude oil affects palm oil production, efforts should be made to diversify the economy by focusing more attention on the agricultural sector.
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