

Impact of Agricultural Value Added on Current Account Balances in Nigeria

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Abstract

The aim of this research paper is to explore the relationship between agriculture value added and current account balances in Nigeria. The study therefore examines the agricultural value added on current account balances over 33 years in Nigeria using data from different sources, from 1980 to 2013. The study found that the variables of interest were stationary at first difference. The Engel Granger two step test of co - integration found that the variables have a long run relationship, while the Johansen test found at least one co-integration relationship among the variables. Agriculture value added has a negative relationship with current account balances in the country in both the long run and the short run. Terms of trade and per capita gross domestic product also have negative with the current account position, while net foreign asset, real effective exchange rate and the gross domestic output have positive effects on the current account position. The short run adjustment parameters however showed that agricultural value added as a percentage of the GDP as well as the net foreign assets are the only variables capable of adjusting to their long run equilibrium within the economy.

Keywords: Current account, Agriculture, Value added, Time series, Nigeria

Introduction

The current account balance of a country assumes a significant dimension in the financial position of any country, and in fact, it is a pointer to the economic performance and the quality of management of such economy, (Calderon *et al*, 2002). It is a record of the country's aggregate net trade in goods and services, the net earnings from other factor services (rents, interest, profits and dividends), includes net transfer payments (funds accrued from pension funds and net workers' remittances from abroad), (Damola and Olateju, 2013). Since it shows the flow of trade, and international transfers, a current account surplus indicates a positive net export within the region of comparison. A current account deficit therefore indicates net import. Current account surplus is however not a common phenomenon in many countries. Concerns about current account imbalances have led to different policy regimes and status. Balanced current accounts determine the extent to which foreign investors will hold assets in the country. Developing countries have been plagued by current account deficits for many years. Africa is especially prone to current account deficits as a result of large government expenditure without commensurate investment. Macroeconomic shocks and changes in international trade policies also determine the extent to which the current account becomes favourable.

The Nigerian economy has experienced different shocks in the past years, which can be mirrored in its balance of payment, and especially the current account balances, (Umo and Fakiyesi, 1995). Such macroeconomic challenges include the need to become food self sufficient with an increase in the population of the country, the increasing importation of food and raw materials as well as the volatility in the prices of oil which significantly affects government expenditure. There is also huge external debts obligation which grew from \$170,000 million in 1970 to \$294,614 million in 1990 and rose to \$2,695,072 million in 2005 before it was reduced to \$451,461 million in 2006; and finally in 2014, it was in the region of \$9,518.95 billion, (Nigeria's Debt Management Office, 2014). The Nigerian economy over the years exhibited a culture of having current account imbalance and which in most cases is in deficit. These imbalances coupled with a number of other macroeconomic shocks have impacted negatively on the Nigerian economy. These imbalances have generated a series of interest by successive government, especially since the domination of the economy by the oil sector to the neglect of agriculture, (Damola and Olateju, 2013), leading to various macroeconomic and trade policies.

However, the over reliance of the Nigerian economy on the oil sector makes it vulnerable to changes in international price of crude oil. Further pressure is put on the current account of the country with the high level of importation of manufactured goods, raw materials and food items, to the exclusion of the development of the local economic production capacity, (Egwaikhide, 1997; Henry and Long, 2003). Shifting and unrealistic exchange rate, increased borrowing on the part of the government and fixed exchange rate further put pressure on the current account balance. However, some policy drifts and policies measures such as Structural Adjustment Programme (SAP) were put in place to restructure and diversify the productive base of the economy and reduce over dependence on the petroleum sector. The over bearing influence of government in term of control of production, interest rate and fixed exchange rate were eliminated with the SAP. To encourage private participation and promote structural reform, government in 2003, initiated the policy of National Economic

Empowerment and Developments (NEEDS). The policy includes comprehensive macroeconomic policies that provides conducive atmosphere in order to accelerate economic growth and development and which further enhance external account position.

The neglect of the Nigerian agricultural sector during various regimes of governance, (Umo and Fakiyesi, 1995, Nweke et al, 2004) has led to deterioration in the quality and quantity of agricultural research and development in the country. Consequently, there has been an increase in the importation of food items, raw materials and other inputs which hitherto could be produced in the country. Food import in Nigeria takes a large percentage of the total import since there is the need to augment local food production in order to meet up with the food demand of the increasing population of the country, (Ojo and Adebayo, 2012). The proportion of food import into the country has invariably had a significant effect on the current account position in recent years, considering that import is still greater than export, (CBN, various issues). However, in a bid to drastically improve balance of payment, the Nigerian government has instituted frameworks to diversify the economy and especially to improve the agricultural sector as an important provider of food, clothing, raw materials, and foreign revenue. This is embedded in the agricultural transformation agenda of the Federal government of Nigeria is aimed at closing the gap in agricultural production capacity compared to the potential. This study thus seeks to examine the role of agricultural value added as a percentage of the gross domestic product over the years on the current account balance in the Nigerian economy. There is a dearth of literature on the movement of agriculture and many macroeconomic variables and especially of current account balances; this study seeks to bridge the gap.

Review of the Theoretical Models of Current Account Balances

This theoretical review stems extensively from the works of Obstef and Rogoff, (1995), Yang, (2011). We review the models of absorption, elasticities and intertemporal approach to determining current account.

The absorption approach is without much reference to individuals' optimization behaviour. The model begins with the national income identity where:

$$Y = C + I + G + X - M \dots\dots\dots 1$$

But, $A = C + I + G$ is the absorption of the national income within the economy, i.e it is the domestic demand. However, the simplest definition of the current account implies that :

$$Ca = X - M \dots\dots\dots 2$$

$$\text{Thus, } Y = A + X - M \dots\dots\dots 3$$

$$\text{And, } X - M = Y - A \dots\dots\dots 4$$

It can then be concluded that the current account is the excess of national production(Y) over absorption (national consumption, A).

The elasticities approach to current account balances focuses on the gap between import and export. The quantities are determined by income, prices and real exchange rate. Given that,

$$Q_M = f(Y, EP^* / P)$$

$$Q_X = g(Y^*, EP^* / P) \dots\dots\dots 5$$

Where, PP is the export price and P* is the import price, E is the exchange rate, so that EP* is the domestic currency. The current account is thus, the difference in the value of export and import,

$$Ca = PQ_X - (EP^*)Q_M \dots\dots\dots 6$$

With the elasticities approach, a country will either depreciate or appreciate the domestic currency with the exchange rate. This is exemplified in the J-curve that explains the effect of currency devaluation on the current account balance. In this case with devaluation, the devaluation first worsens the current account balance before getting better.

The intertemporal optimization approach and the Savings and investment balance approach are models that examine the optimization of all individuals, such that production and consumption decisions are based on optimizing utility. In this case, the current account becomes the balance between individual lending and borrowing. Thus, if the aggregate show more lending than borrowing, there is a current account surplus and if otherwise, there is a deficit.

The intertemporal approach explains the current account with variables of consumption, savings and investment decisions. It sees the current account balance as the difference between Savings and investment.

$$Ca = S - I \dots\dots\dots 7$$

Thus, the determinants of current account balances are the variables that affect the two identities in the current account equation.

Thus, the present study draws from the intertemporal approach and examined the macroeconomic variables of

national output (GDP), net foreign assets, terms of trade, real effective exchange rate, and per capita GDP. However as a component of the national output, we have decided to look at agricultural value added as a variable in the empirical model, given its increasing role in the Nigerian economy.

Review of Empirical Literature

Empirical studies on current account balances are many and varied. Sachs, (1981) found differences in current account balances for both developed and developing countries with respect to whether they are OPEC members or not. The study also found that domestic inflation is a main cause of current account deficits in many countries, especially for countries dependent on oil import. Yang, (2011) examined the determinants of current account balances in some emerging Asian countries and found that current account balances are affected by certain macro economic variables, although the degree differ among countries. Chinn and Prasad,(2003), found that government spending and initial stock of foreign assets had positive effect on the current account balance of industrialized countries, while measures of financial deepening was positively correlated with the current balances in developing countries. Using a panel data, Herman and Jochem, (2005) found that current account deficits in certain European countries are a result of differences in developmental stages as shown by income and high capital building. Lane (2000) postulates that a higher degree of trade openness is often associated with greater output volatility, which calls for the need to accumulate substantial net foreign assets for the purpose of income smoothing and risk diversification by incurring current account surplus. A more liberalized trade economy leading to lower domestic prices and depreciation of exchange real exchange rates (Edwards and Ostry 1990; Goldfajn and Valdes 1999), may improve the current account balances. Soyoung, (2001).

Lu and Min (2009) using general equilibrium approach of expectation, examined a small open economy and discovered that current account sensitivity to monetary policy shocks is due to elasticity of substitution among investment, consumption and risk aversion and that account efficient response to technological shocks. Henry and Long (2003) examine the current account dynamics and exchange rate behaviour in Jamaica. Their findings show that change in real exchange rate exact significant influence on economic activities by changing the relative returns in the tradable and non-tradable sectors. Using both cross sectional and panel data, Denelle and Faruqee, (1996) found that development stages and demographics have long run effects on the current account position in the United States, while real exchange rate, business cycle and terms of trade have short run effects on the current account.

Studies such as Olopoenia (1986), Chete (2001), Egwaikhide, (1997); Henry and Long (2003) have specifically examined the impact of monetary policy and deficit budget on the current account balances in Nigeria. Olopoenia (1986) adopted Morgan's analytical framework to evaluate the implications of fiscal operations in Nigerian's balance of payments developments. The policy relevance of this theoretical exposition is the recognition that adequate care must be taken in financing budget deficit through credit creation in order to achieve the macroeconomic objective of price stability with external balance. Chete (2001) found that a negative relationship exist between current account balance and inflation, income as well as degree of openness in Nigeria. The study further identified the positive relationship between current account balance and net foreign assets, budget deficit and exports.

Thus, although, different studies have examined current account balances of different economies, using varying macroeconomic economic variables, there is limited literature on the effects of sectoral impact on the current account balances. Gehringer, (2013), examined current account imbalances in the European Union and found that the construction and service sector have aggravating influences on the current account. However, there is dearth of literature on the effect that agriculture has on current account balances. The study intends to therefore examine the dynamics of current account balances in Nigeria, investigating among other variables, the long run relationship with agricultural value added, in a bid to explore policy options that will improve the Nigeria's government drive to make agriculture a key sector in the economy.

Materials and Methods

Sources of Data

The study used annual time series data for 33 years sourced from the Central Bank of Nigeria Annual Abstract of Statistics, 1980 - 2013, International Monetary fund, International Financial Statistics 2013, World Bank and World Economic Outlook data (1980-2013).

Empirical model

The variables used in the research are based on a priory expectation of current account balances determinants and they are as follows. The variables thus include Current account balance as a percentage of the Gross Domestic Product (GDP), Gross Domestic Product, real exchange rate, Net foreign assets, terms of trade, degree of openness and agricultural value added as a percentage of the gross domestic product (GDP). Thus, the empirical model is explicitly stated as follows:

$$Ca = f(reer, nfa, gdp, agric, pergdp, open, tot) \dots\dots\dots(8)$$

Where,

Ca is the current account balance as a percentage of the GDP; *reer* is the real interest rate; *nfa* is the lagged value of the net foreign asset (the lagged value is used in order to avoid the problem of serial correlation with the *cagdp*); *gdp* is the national output/income; *Agric* is the agriculture value added as a percentage of GDP; *pergdp* is the per capita gdp; *open* is the degree of openness in the economy while *tot* is the economy's terms of trade.

Data Analysis

Analyzing the dynamics of current account balances with the data available will take the following form:

- a. Test of Stationarity: time series data usually follow a random walk, i.e they are not stationary. When variables follow a random walk, they are said to have a unit root and thus can lead to spurious regression when used in econometric analysis. The presence of a unit root is tested for in this data using the Augmented Dickey Fuller test, which was validated with the Phillip Perrons test. The Phillip Perrons test is also used here since it behaves more efficiently with small samples like this.
- b. Co integration: as a rule, non stationary time series are not to be used in regression models, to prevent spurious regression. However, a linear combination of two non stationary time series may be stationary (Engel and Granger, 1987). When such a linear combination is possible, then it is assumed that the series are stationary and there is a long run relationship among the variables. We use both the Granger and Johansen co integration tests to determine the presence of a long run relationship among the variables used in the study. The Granger two step test of co integration involve regressing the dependent variables against the independent variables and generating the residuals of the regression equation in the first stage. The second stage involves carrying out a unit root test on the residual. If the residual is stationary, then there is a long run relationship among the variables; and the linear combination can be used to interpret the long run relationships among the variables of interest.
The Johansen Juselius test of co integration is based on a Vector Autoregressive (VAR) approach. The Johansen Juselius test tells us the number of long run relationships that can be derived from a linear combination of the variables.
- c. Vector Error Correction model: given that there is a co integration in the variables, the short run relationship is examined using the vector error correction model (VECM). It helps to explore the short run dynamics of the endogenous variables, keeping them consistent with the long run relationship (Yang, 2011). The VECM explores the impact of the independent variables on the dependent variables in the short run. It also shows the degree of adjustment of current account balance from its long run deviation.

Results and Discussion

Figure 1 is a graph that shows the movement of the Nigerian current account balances and agricultural value added over the 33 years of the data used. The figure shows an inverse relationship among the two variables. It is seen that in years when agricultural value added increase, there is a current account deficit. This is consistent with economic theory of saving and investment in which high levels of investment bringing about dis-savings in the economy, lead to a current account deficit.

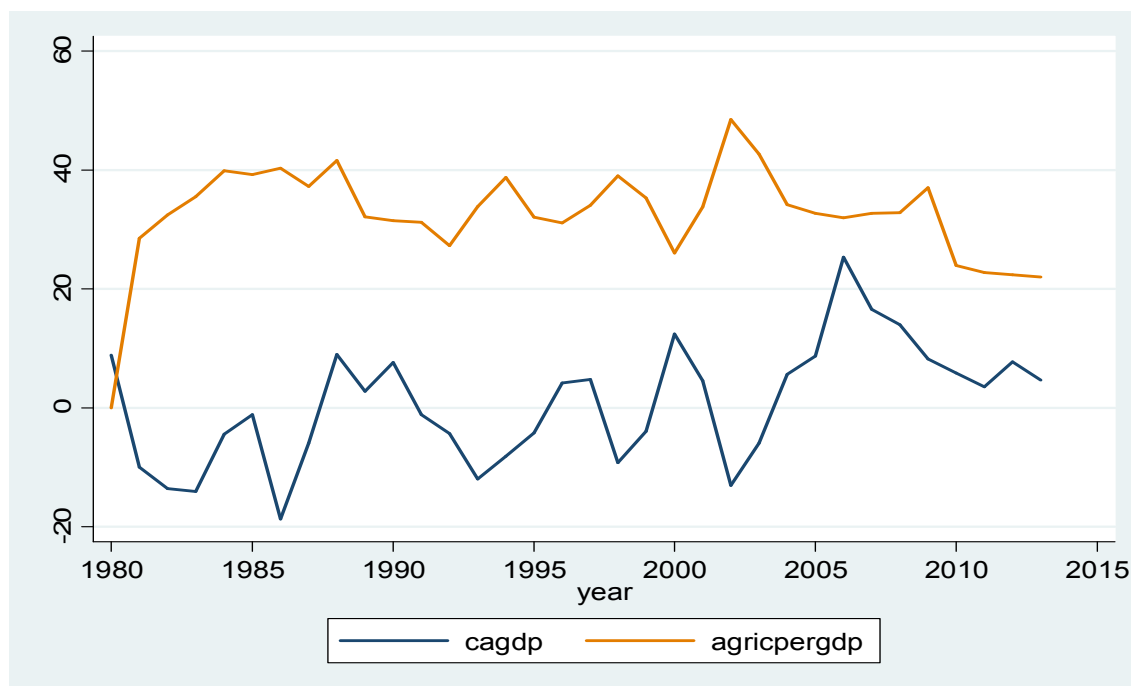


Fig 1: Correlation between Agricultural value added and Current Account Position in Nigeria
 Source: STATA 11 Graph Editor, 2014

Unit Root Tests

The presence of unit root was examined in the series using both the Augmented Dickey Fuller test and the Phillip Perrons test (table 1). We cannot reject the hypothesis of unit root for all the variables at their levels, except for the cagdp and agricgdp and the tot at 5%. However, with first differencing, all the variables become stationary at 1%.

Table 1: Augmented Dickey Fuller and the Phillip Perrons Tests

Variables	ADF Test		Phillip Perron	
	Levels	First difference	Levels	First difference
Cagdp	-3.087**	-6.116***	-3.162**	-6.819***
Reer	-1.742	-3.859***	-1.934	-3.715**
Agricgdp	-5.487***	-7.047***	-5.268***	-8.841***
Nfa	-1.177	-5.753***	-1.377	-5.824***
Gdp	2.911	-5.019***	4.707	-5.202***
Gdppercap	1.922	-5.401***	2.452	-5.504***
Open	-2.325	-7.974***	-2.299	-8.004***
Tot	-3.392**	-7.334***	-3.257**	-7.958***

Source: Data Computation by authors, 2014.
 *,** and *** represent significance at 10%, 5% and 1% respectively

Time series analysis depends on the choice of lag lengths to include in the equations within the model. The choice of lag length is determined by a number of criteria. However, for this study, we have chosen the lag length selected by the HQIC, SBIC. Although the AIC is commonly used, when requested on STATA 11, the AIC set the lag length to 4, which when applied to determine the number of co integrating equation, gave an error message. Thus, since the other two criteria gave similar lag length choice of 2, we decided to use 2 as our lag length for the rest of the analysis.

Long Run Dynamics of Current Account Balances in Nigeria

The long run relationship was investigated using both the Johansen Juselius model and the Engel Granger model. Table 2 presents the result of the Johansen Juselius model used to determine the number of co integrating equations in the model estimated. The Johansen Juselius uses both the trace and maximum Eigen values to determine the number of co integrating equations. We concluded from the trace statistics, that there is at least

one co integrating relationship among the variables, significant at 1%. Both the trace statistics and the Max statistics gave the result that we have at least one co integrating relationship among the variables at 1% significance level.

Table 2: Johansen Juselius Co integration Test

Number of co integrating equations	Lag length	Trace statistics	Max statistics
1	2	109.882***	37.261***

Source: Data Computation by authors, 2014.

*,** and *** represent significance at 10%, 5% and 1% respectively

The Engel Granger two steps co integration equation was also used to determine the co integrating co efficient among the variables within the model. The first stage is an ordinary least square regression of the variables at their levels against current account balance to GDP ratio. The second step is the unit root test for vector of the residual generated by the first equation. If the residual is stationary, then we conclude that there is a long run relationship among the variables, and we can interpret the coefficients. Also, a graph of the residual should show no patterns and there should be no correlation between error terms

Table 3 presents the result of the two step Engel granger co integration test. The residual from the regression is stationary at 1% and thus, we can conclude that there is a long run relationship among the variables in our model. The line graph of the residual is presented in Fig 2, showing stationarity of the residual and confirming that there is indeed co integration among the variables. The results show that agricultural value added as a percentage of the GDP , per capita GDP, net foreign assets, real effective exchange rate and GDP significantly determine current account balances in Nigeria at 1%, while the terms of trade determines it at 5%. Agricultural value added and per capita GDP and terms of trade have negative relationship with the current account balances, implying that they move in opposite directions. However, the real exchange rate, GDP and net foreign assets have positive relationship with the current account position.

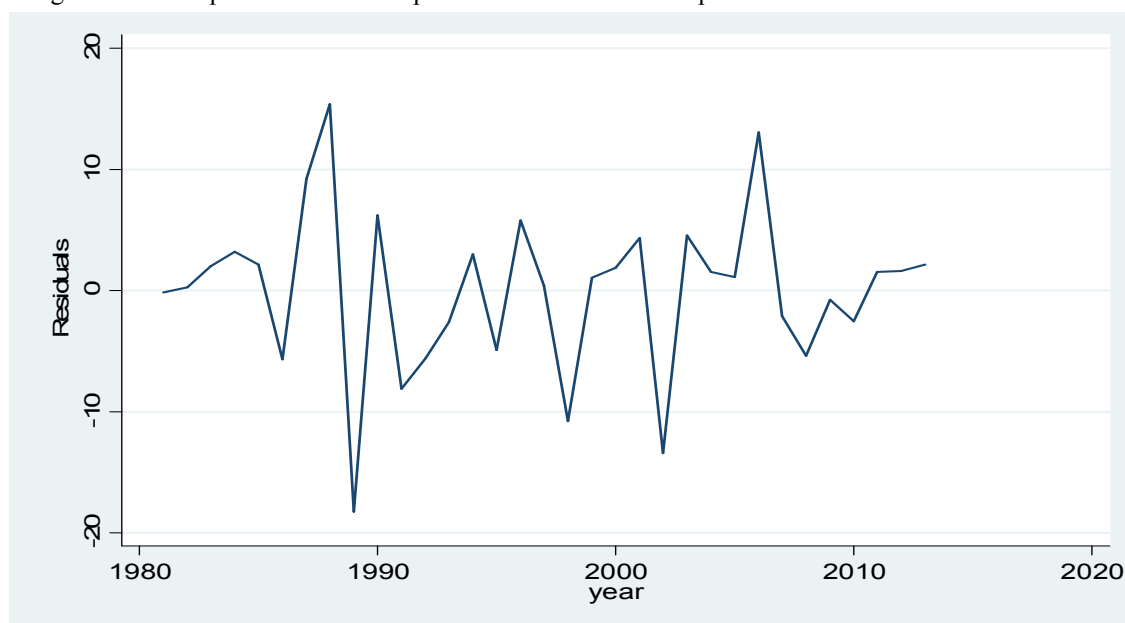


Fig 2: Graph of Residual in the Engel Granger Co integration Regression

Source: STATA11 Graph Editor, 2014

Table 3: Long run relationship of the current account balances in Nigeria: Johansen Normalisation Imposed

Variables	Coefficients
Dcagdp	1
Dreer	0.038***
Dagricgdp	-3.109***
Dlagnfa	0.013***
Dgdp	0.0000***
Dpercagdp	-0.529***
Dopen	0.041
Dtot	-21.813**

Source: Authors computation using STATA 11, 2014

*,** and *** represent significance at 10%, 5% and 1% respectively

Having determined that there is co integration among the variables, the next stage is to determine the short run equilibrium of the variables on the current account of Nigeria's economy. If there is at least one co integration vector among the variables, then there will be a corresponding error correction variable. Using the Vector Error Correction Model command on STATA 11, we get both the co integrating equation, with the Johansen Normalization imposed as well as the short run equilibrium of the interactions among the variables. Table 4 is the co integration equation that shows the long run relationship among the variables. It shows the co integrating equation of determinants of current account balances in Nigeria.

Short Run Dynamics of Current Account Balances in Nigeria

Table 4 shows the results of the short run determinants of the current account position. The results showed that in the short run, only the coefficient of real exchange rate, net foreign assets and terms of trade have significant effects on the current account position in the short run at 10%, 1% and 5% respectively. In the short run, an appreciation of the domestic exchange rate leads to a negative current account position, while an increase in the net foreign asset and the terms of trade significantly increases the current account balances of the economy.

The adjustment of macroeconomic variables to their long run position can also be determined from the VECM. In the VECM, the error correction representation can be described as the level of disequilibrium in the co integration relationship and the fluctuations in the explanatory variables, (Yang, 2011). Estimating an error correction model helps to determine the speed of adjustment of the variables back to their long run equilibrium. When the error term is correctly signed and significant, it explains that the current account balance as a percentage of gdp is able to control for short term variations in the long run. Table 5 is a result of the short run adjustment of the variables of the current account balances in Nigeria.

Table 4: Short run Determinants of current account balances in Nigeria

Variables	Coefficients	Standard Error
Dreer	-0.042*	0.025
Dagricgdp	0.109	0.340
Dlagnfa	0.007***	0.002
Dgdp	0.000	0.000
Dpercapgdp	-0.091	0.079
Dopen	-10.846	10.594
Dtot	10.230**	3.536
Constant	-2.622	13.253

Source: Authors computation using STATA 11, 2014
 *,** and *** represent significance at 10%, 5% and 1% respectively

Table 5: Short run dynamics of determinants of current account balances in Nigeria

Variables	Adjustment parameters(α)	Standard errors
Dreer	-0.264	1.101
Dagricgdp	0.193**	0.094
Dlagnfa	-21.483**	10.041
Dgdp	0.000	0.000
Dpercapgdp	1.026	3.925
Dopen	0.002	0.002
Dtot	0.000	0.007

Source: Authors computation using STATA 11, 2014
 *,** and *** represent significance at 10%, 5% and 1% respectively

The results revealed that agricultural value added as a percentage of the gdp as well as the net foreign assets are the only variables capable of adjusting to their long run equilibrium within the economy at 5% significance level.. However, agricultural value added will converge to its equilibrium position more slowly than net foreign asset. The VECM can also be used to determine the direction of causality among the variables within the study. The granger causality can be uni directional or bi directional. Table 6 presents the Granger causality runs of the variables. Table 7 reveals that lagged values of current account balances determine future current account balances. Also, there is two-way granger causality between real exchange rate and current account balances. This reveals the importance of the real exchange rate on current account balances even as validated from literature. While most variables granger cause current account balances; the current account balances itself does not granger cause any variable. Thus, it is a purely endogenous variable in the economy.

Table 6: Granger Causality

Variables	L.Dcagdp	L.Dreer	L.Dagricgdp	L.Dlagnfa	L.Dgdp	L.gdppercap	L.Dopen	L.Dtot
Dcagdp	-0.395**	3.165*	-0.087	-8.957	-0.000	-2.781	0.000	0.007
Dreer	-0.042*	-0.230	0.006	2.093	9313650	0.056	-0.000	-0.002*
Dagricgdp	0.108	0.811	0.054	-20.150	-0.00	-6.342	0.007	0.015
Dlagnfa	0.007***	-0.009	-0.003**	-0.458**	-62222400	-0.035	0.000	0.000***
Dgdp	0.000	0.000*	0.000	0.000	-1.850	0.000	-0.000	0.000***
Dpercagdp	-0.091	-1.075*	0.048	-4.619	0.000	0.997	0.001	-0.010**
Dopen	-10.846	72.529	16.311**	-915.94	-0.000	-202.284	-	-
							6580324***	1.639***
Dtot	10.230**	7.449	-0.379	180.124	-0.000	-83.616	0.073	-0.240

Source: Authors computation using STATA 11, 2014

*,** and *** represent significance at 10%, 5% and 1% respectively

Summary and Conclusion of Research Findings

The article examined the effects of different macroeconomic variables, on the current account balances in Nigeria for 33 years. The study however paid specific attention to the impact of agricultural value added on the current account balances; in view of the importance that agriculture is expected to have on the Nigerian economy in the near future. The variables have different effects on the current account position in the long run and the short run. While all the variables except the degree of openness have long run effects on the current account position, only the agricultural value added, net foreign asset and terms of trade have short run effects on the current account position.

Agricultural value added has a negative relationship with current account balance is a negative one; in which an increase in agricultural value added is consistent with a reduced current account balance both in the short run and the long run. The explanation for this is integrally connected to the savings and investment identity that models the current account balance, such that when an economy invests more than it saves, it invariably leads to a current account deficit, (Yang 2011). Thus, with increasing investment in the agricultural sector, there is an increasing deficit of the current account balance. However, this should not be a cause for concern, since it is expected that increasing investment in the country is expected to lead to an increase in overall domestic output in the long run. It is also expected that with an increase in agricultural investment, the economy will come to a stage where it will have sufficient domestic food and raw material production and then become a net exporter. Thus, as the Nigerian economy becomes more diversified, we expect a more positive effect as the agricultural sector becomes more stable and national production increases.

The other macroeconomic variables behaved as expected. In the long run, all the variables have varying levels of influence on the current account balances, except for the coefficient of the degree of openness. While real effective exchange rate, stock of net foreign assets, gross domestic product (GDP) are positively related to the current account, agricultural value added and per capita GDP have negative relationship with it. A priori expectation confirms that an increase in national production as seen in the GDP means an improvement in the current account position. This is the same with the stock of net foreign assets. When the stock of net foreign asset is increased, there is expected to be a positive growth in the current account balance. This is seen in the Nigerian situation within this study. Terms of trade have a negative relationship with the current account balance and this is suggestive of the import dependence of the Nigerian economy. The importance of demographic characteristics is seen in the significance of per capita gdp on the current account balances in the long run. The coefficient of per capita gdp is negative, indicating that there is a great deal of pressure on the Nigerian economy, as seen in the current account balance. This may be explained by the need for a large level of importation of food and other consumables to satisfy the teeming and increasing population of the country. This is especially important with a large number of dependents (89%) and unemployed persons in the country, (World Bank 2014).

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