APPRAISAL OF AGRICULTURAL SUBSECTORS GROWTH IN VARIOUS POLICY REGIMES IN NIGERIA

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ABSTRACT
The contribution of agriculture to overall GDP decreased from 64% in 1960 to 46% in 2010. This is as a result of abysmally poor performance of its subsectors. With the exception of crop sub sector, livestock share of agricultural GDP declined from 24% in 1980 to 6% in 2010; forestry from 4% to 1% and fishery from 11% to 3% respectively. In response to this scenario, this study evaluated the performance of agricultural subsectors in various policy regimes from 1961 to 2010 in Nigeria. The aim was to identify the regime that contributed more to the agricultural sector from which appropriate recommendations could be derived. Hence, the study estimated the exponential trend in output of each agricultural subsector and analysed each trend behaviour under different policy regimes. Secondary data consisting of each subsector output measured in million tonnes and obtained from Central Bank of Nigeria Statistical bulletins of various years were used. Regression analysis based on Ordinary Least Squares technique was used to estimate the exponential equation for each subsector. The result of the trend analysis confirmed deceleration of outputs of all agricultural subsectors. The result also showed inconsistency in growth pattern reflecting the volatile nature or uncertainty of the Nigeria's economy. However, the result also showed that the period (1995-2010) of liberalization policy regime accelerated outputs of agricultural subsector compared to other policy periods considered in the study. The results therefore call for policies that will accelerate investment in the agricultural sector. Interest should also be channelled to policy continuity and sustainable liberalization of the country's economy.

Keywords: Agriculture, policy regime, acceleration, liberalization and Nigeria.

INTRODUCTION
Nigeria has great potential to become the food basket of the West African Sub-region given that she is endowed with huge expanse of arable land, beneficial climate, abundant streams, lakes, forest and grassland, as well as large, active population that can sustain a highly productive agriculture (FAO, 2003; Imoudu, 2005).Despite these enormous qualities and contributions of agriculture, the sector has slipped into a systemic decline, particularly in the past four decades. In Nigeria, the contribution of agriculture to overall GDP went from 64 percent in 1960 to 46 percent in 2010. This is as a result of its subsectors performing abysmally poorly. Table 1 showed that with the exception of crop sub sector, livestock share of agricultural GDP declined from 24 percent in 1980 to 6 percent in 2010; forestry from 4 percent to 1 percent and fishery from 11 percent to 3percent respectively (CBN, 2010).

Nigeria has experienced four policy regimes since independence (Abolagba et al., 2010; Ojiako, 2008). The period of 1961-1970 was characterized by diversification of resources to other sectors other than agriculture. The period of 1970-1985 was characterised by restrictive or regulated economic policy. It witnessed more direct government intervention in agriculture in the face of the noticeable decline in agriculture performance. For example, marketing board was established to handle agricultural produce.

Table 1: Percentage share of agricultural subsectors to the growth of agricultural   GDP

Year	Crop	Livestock	Forestry	Fishery
1960	80	9	8	3
1965	78	9	10	4
1970	76	8	7	9
1975	65	8	4	18
1980	61	24	4	11
1985	80	13	4	3
1990	81	11	3	5
1995	84	10	3	3
2000	83	10	2	5
2005	90	6	1	3
2010	89	6	1	3
Mean	**78.82**	**10.36**	**4.27**	**6.09**

Source: Computed by authors, data from Central Bank of Nigeria Statistical Bulletins of various issues

The third period, 1986-1994, ushered in structural adjustment program (SAP) which became a forerunner to the liberalization of Nigerian agricultural exports. It marked the beginning of a deregulated economy. Exchange rate deregulation was the major policy instrument. The last and current period, 1995- till date is the liberalized policy era. The three documents that clearly spell out Nigeria's vision for agricultural development in this regime, especially when the civilian administration took over in 1999, are the National Economic Empowerment Development Strategy (NEEDS), National Agricultural Policy (NAP) and Rural Sector Strategy (RSS), 2004. The overall strategic objective of the NEEDS and NAP is to diversify the productive base from oil and to promote market-oriented and private sector-driven economic development with strong local participation.

The Nigerian civilian government that commenced towards the end 1990's has, in addition to the aforementioned policies, initiated and endorsed many national and international projects, programs, and policies aimed at rapid agricultural growth. These include the implementation of the Comprehensive Africa Agriculture Development Program (CAADP), the National Food Security Program (NFSP), the Agriculture 5-point Agenda, (Diao *et al.,* 2010).   Recent developments, therefore, suggests that Nigeria's greatest desire is to carry out economic transformation and increase economic growth by reviving and restructuring her neglected agricultural sector.

Various policy regimes in Nigeria had launched Agricultural policies and programmes to boost food production. Some of them are: National Accelerated Food Production Programme (NAFPP), launched in 1972; Operation Feed the Nation, launched in 1976; River Basin and Rural Development Authorities, established in 1976; the promulgation of a Land Use Decree in 1978 which nationalized all land, and established new Commodity Boards; Green Revolution Programme, inaugurated in 1980.

The reason for deregulation as the policy trust of SAP and other aforementioned programmes was to put the agricultural sector and the economy on a sustainable growth path. This has not been achieved as intended since food supply could not meet up with demand. When SAP policies were executed as intended by the IMF, the Nigerian economy actually did grow as was expected. The growth manifested between 1986 and 1988, with the export sector performing especially well. However, the falling real wages in the public sector amongst the urban classes, along with a drastic reduction in expenditure on public services, set off waves of rioting and other manifestations of

discontent that made sustained commitment to the SAP difficult to maintain (Umebali and Akubuilo, 1992).

Post SAP projects, programs, and policies by Nigerian government also included the National Economic Empowerment and Development Strategies (NEEDS I and NEEDS II), the implementation of the Comprehensive Africa Agriculture Development Program (CAADP) and the National Food Security Program (NFSP) (Diao *et al,* 2010). Despite all these efforts by various policy regimes, the agricultural sector has not been able to achieve the expected results as food supply is unable to keep pace with demand (Diao *et al.,* 2010; Tanko *et al.,* 2006; FAO, 2004). To formulate strategies for achieving sustained production and rapid growth necessary for poverty eradication, relevant information is absolutely necessary. It is therefore important to decompose the structure of agricultural sector into its subsectors to gain better understanding of those factors that have produced differences in growth rates in various periods. This study therefore evaluated the performance of the past policy regimes on each agricultural sector in Nigeria. This would contribute to the design of appropriate policy instruments that might result in higher growth rate in agricultural sector.

METHODOLOGY
The study was conducted in Nigeria which is one of the largest countries in Africa and lies wholly within the tropics along the Gulf of Guinea on the western coast in Sub-Saharan Africa. Nigeria lies between 4^0 and 14^0 North of the equator and between longitudes 3^0 and 15^0 east of the Greenwich. Nigeria has a total land area of 923,768.622km or about 98.3 million hectares, and population of151.874 million people (IMF, 2011; Lafiagi, 1984). Nigeria has a highly diversified agro-ecological condition, which makes possible the production of a wide range of agricultural products. Smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land (Manyong *et al.***,** 2003).

This study relied on the use of aggregate secondary data with a span of 50 years (1961-2010). Time series annual data on real crop GDP, real livestock GDP, real forestry GDP and real fishery GDP were obtained from Central Bank of Nigeria (CBN), 2010 issues. Other relevant information was obtained from journal, bulletins, and proceedings.

In order to evaluate the performance of agricultural subsectors in various policy regimes in Nigeria, this research estimated the linear and quadratic exponential trend equations. Coefficient in the linear exponential trend equation indicates the exponential growth rate or the effect of time on real crop, while the coefficient of the quadratic term (t^2) allows for the possibility of acceleration, deceleration or stagnation in growth during the period under study (Sawant, 1983; Onyenweaku and Okoye, 2005)

Model Specification
The regression model used in this study is shown below:

$$CR_t = \exp(\beta_0 \ + \ \beta_1 t + \ \varepsilon_t \ \dots \dots \dots \dots \dots \dots \dots. (1)$$

Where

CR = Real crop GDP
t = Time trend measured in years;
β_0 = Intercept or constant of the trend equation;
β_1 = Slope or trend coefficient;
ε = The error term.

If linearized by taking the natural logarithm of both sides, equation (1) becomes:

$$LnCR_t = \ \beta_0 \ + \ \beta_1 t + \ \varepsilon_t \ \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots. (2)$$

Where $\ln CR_t$ is the natural logarithm of real crop GDP; and all other variables were as previously defined. To ascertain growth pattern, and consequently test the hypothesis of whether there will be acceleration, stagnation or deceleration in growth of real crop GDP, the quadratic equation, fitted to the data for the periods covered, is specified as:

$$LnCR_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Variables $LnCR_t$ and "t" are as previously defined and β_0, β_1 and β_2 are unknown parameters to be estimated. In testing the specified hypothesis in (2.3), If β_2 is positive and statistically significant there is acceleration in growth; if β_2 is negative and statistically significant there is deceleration in growth; if β_2 is positive or negative but not statistically significant there is stagnation in the growth process (Onyenweaku and Okoye, 2005; Anyaegbunam *et al*., 2006; Ojiako, 2008).

The specified equations were also used to analyse the growth pattern in livestock GDP, Forestry GDP and Fishery GDP. The periods (t) represent different policy regimes and they are as follows: 1961-1970 = Policy of diversification; 1971-1985 = Policy of Reconciliation, Rehabilitation, Reconstruction and Economic Stabilization; 1986-1994 = Policy of Structural Adjustment and1995-2010 = Policy of liberalization. Each of the agricultural subsectors provided framework for examining each policy regime. Doing this identified the policy regime that made more impact on the growth of the agricultural subsectors. It is expected that, $\beta_2 > 0$ and statistically significant.

RESULTS AND DISCUSSION
Crop growth trend under different policy regimes
In Table 2, the results of the trend showed that the slope coefficients were positive and statistically significant, implying that significant increases were recorded; except for 1961-1970 periods when crop growth decelerated. The results of the quadratic trend in Table 3showed that the slope coefficients for t^2 for periods 1961-1970, 1986-1994 and 1995-2010 are negative and not significant confirming stagnation. The coefficients for t^2 are positive and not significant for 1971-1985 also confirming stagnation of growth; while 1961-2010, the aggregate period was negative and significant confirming deceleration of growth.

Table 2: Estimated trend equations for Nigeria's crop sub-sector GDP, 1961-2010

Period	β_0	β_1	R^2	F-value	Sig.
1961-1970 (n=10)	6.8***(108.77)	-0.02*(-2.03)	0.37	4.11	0.080
1971-1985 (n=15)	6.48***(20.51)	0.27***(8.37)	0.60	11.96	0.000
1986-1994 (n=9)	10.91***(581.06)	0.04***(12.46)	0.96	155.06	0.000
1995-2010 (n=16)	11.10***(176.06)	0.09***(14.82)	0.94	219.74	0.000
1961-2010 (n=50)	6.40***(36.24)	0.13***(21.51)	0.92	462.69	0.000

***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Computed by researcher From CBN 2010

Table 3: Estimated quadratic equations in time variable for Nigeria's crop sector GDP, 1961-2010

Period	β_0	β_1	β_2	R^2	F-value	Sig
1961-1970 (n=10)	7.15***(58.00)	0.02(0.41)	-0.005(-0.88)	0.12	2.37	0.410
1971-1985 (n=15)	7.07***(14.37)	0.08(0.57)	0.01(-1.57)	0.86	39.48	0.150
1986-1994 (n=9)	10.89***(2143.23)	0.05***(11.38)	-0.001***(5.42)	0.96	71.43	0.536
1995-2010 (n=16)	11.08***(104.09)	0.10***(3.52)	-0.0002(-0.17)	0.94	102.26	0.868
1961-2010 (n=50)	5.76(20.65)	0.20(8.28)	-0.001**(-2.91)	0.92	271.27	0.001

***=significant at 1%;**significant at 5%; t-values are in parentheses
Source: Estimates from data (CBN 2010)

Livestock growth trend under different policy regimes

Like the case for crop sub-sector, livestock trend growth, in Table 4, did not change. Significant growths were observed during the rest of the periods except in 1961-1970 where there was stagnation. The results for the quadratic trend in Table 5 showed that the slope coefficient of t^2 for 1961-1970 showed negative and insignificant values confirming stagnation while the slope coefficient of t^2 for 1971-1985; 1986-1994 and the aggregate data showed negative and significant values confirming deceleration of growth. The result also showed that the slope coefficient of t^2 for 1995-2010 (liberalization period) had positive and significant values confirming acceleration of growth.

Table 4: Estimated trend equations for Nigeria's livestock sub sector GDP, 1961-2010

Period	β_0	β_1	R^2	F-value	Sig.
1961-1970 (n=10)	5.05***(89.34)	-0.02(-1.54)	0.25	2.39	0.1663
1971-1985 (n=15)	4.48***(20.56)	0.31***(13.84)	0.93	191.60	0.000
1986-1994 (n=9)	9.09***(652.35)	0.01**(4.31)	0.73	18.57	0.003
1995-2010 (n=16)	9.10***(378.31)	0.05***(18.97)	0.96	359.81	0.000
1961-2010 (n=50)	4.69***(1.68)	0.12***(15.82)	0.84	250.13	0.000

Note: ***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Estimates from data (CBN 2010)

Table 5: Estimated quadratic equations in time variable for livestock sub sector GDP, 1961-2010.

Period	β_0	β_1	β_2	R^2	F-value	Sig
1961-1970 (n=10)	4.96(54.46)	0.02(0.58)	-0.03(-0.90)	0.26	1.29	0.399
1971-1985 (n=15)	4.28(11.83)	0.38(3.87)	-0.03*(-0.71)	0.91	92.63	0.049
1986-1994 (n=9)	9.04(817.07)	0.04(2.31)	-0.002**(2.81)	0.93	37.40	0.007
1995-2010 (n=16)	9.21(1003.77)	0.01(12.82)	0.002***(3.22)	0.999	3143.82	0.000
1961-2010 (n=50)	3.32(12.15)	0.27(11.22)	-0.003***(-6.35)	0.91	247.78	0.000

***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Estimates from data (CBN 2010)

Forestry growth trend under different policy regimes

The results of the trend in Table 6 showed that the coefficients were positive and significant for all periods except for 1961-70 when the coefficients were negative and significant indicating deceleration; and 1986-1994 when the coefficient was negative and insignificant indicating stagnation. The results of the quadratic trend in Table 7 showed that slope coefficient for t^2 is positive and insignificant for 1961-1970 confirming stagnation; but positive and significant for the periods 1971-85, 1986-1994 and 1995-2010 confirming acceleration of growth. The aggregate forestry data, 1961-2010, showed coefficient of t^2 to be negative and significant confirming deceleration.

Table 6: Estimated trend equations for Nigeria's forestry sub sector GDP, 1961-2010

Period	β_0	β_1	R^2	F-value	Sig.
1961-1970 (n=10)	5.15***(30.58)	-0.10*(-3.05)	0.57	9.33	0.020
1971-1985 (n=15)	4.11***(14.87)	0.11***(8.01)	0.82	64.19	0.000
1986-1994 (n=9)	7.83***(118.27)	-0.01(-1.25)	0.18	1.55	0.252
1995-2010 (n=16)	7.68***(257.32)	0.03***(11.00)	0.90	121.07	0.000
1961-2010 (n=50)	4.38***(23.01)	0.09***(14.01)	0.80	196.29	0.000

Note: ***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Estimates from data (CBN 2010)

Table 7: Estimated quadratic equations in time variable for forestry sub-sector GDP, 1961-2010.

Period	β_0	β_1	β_2	R^2	F-value	Sig
1961-1970 (n=10)	4.76***(18.61)	0.12(0.99)	0.002(-1.81)	0.72	7.82	0.12
1971-1985 (n=15)	4.70***(11.20)	0.03(0.29)	0.01*(1.77)	0.86	36.60	0.099
1986-1994 (n=9)	7.99***(83.46)	-0.11**(-2.35)	0.01**(2.06)	0.52	3.27	0.005
1995-2010 (n=16)	7.81***(579.75)	-0.01**(-3.34)	0.003***(13.00)	0.99	871.98	0.000
1961-2010 (n=50)	3.54***(13.16)	0.18**(7.63)	-0.002***(-3.95)	0.85	135.90	0.000

Note: ***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Estimates from data (CBN 2010)

Fishery growth trend under different policy regimes
The results in Table 8 showed that the coefficients of the time trend were positive and significant for all periods indicating growth except for 1986-94 where there was stagnation. This implied that Nigeria's fishery sub-sector GDP recorded growth in all regimes except in the structural adjustment policy regime. The results of the quadratic trend in Table 9showed that the slope coefficient for t^2 is negative and insignificant for 1961-1970 and1971-1985 confirming stagnation but negative and significant for 1986-1994, 1995-2010 and 1961-2010 confirming deceleration.

Table 8: Estimated trend equations for Nigeria's fishery sub-sector GDP, 1961-2010

Period	β_0	β_1	R^2	F-value	Sig.
1961-1970 (n=10)	3.57***(38.35)	0.14***(8.49)	0.91	72.16	0.000
1971-1985 (n=15)	5.00***(18.48)	0.21***(7.38)	0.80	54.64	0.000
1986-1994 (n=9)	7.7***(34.37)	0.06(1.57)	0.26	2.46	0.10
1995-2010 (n=16)	8.11***(239.71)	0.07***(21.35)	0.97	455.90	0.000
1961-2010 (n=50)	4.22***(23.41)	0.11***(18.60)	0.88	345.96	0.000

Note: ***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Estimates from data (CBN 2010).

Table 9: Estimated quadratic equations in time variable for fishery sub-sector GDP 1961-2010.

Period	β_0	β_1	β_2	R^2	F-value	Sig
1961-1970 (n=10)	3.44***(21.06)	0.21**(2.85)	-0.01(-0.99)	0.92	36.51	0.35
1971-1985 (n=15)	4.65***(10.55)	0.32**(2.67)	-0.01(-0.97)	0.81	27.68	0.35
1986-1994 (n=8)	7.02***(27.70)	0.44***(3.74)	-0.04***(-3.29)	0.74	8.35	0.017
1995-2010 (n=15)	7.98***(968.01)	0.12***(16.43)	0.002***(0.28)	0.999	670.62	0.000
1961-2010 (n=50)	2.99(1.09)	0.24***(15.07)	0.002***(8.42)	0.95	460.26	0.000

Note: Asterisks ***=significant at 1%;**significant at 5%; t-values are in parentheses.
Source: Estimates from data (CBN 2010)

Summary of estimated quadratic equations in the four sub-sectors GDP under different policy regimes 1961-2010.
Table 10 summarized the result of the estimated quadratic equations in time variable for the four sub-sectors' GDP under different policy regimes for evaluation. Table 10 showed the overall result of the analysis of the four sub-sectors that made up the agricultural sector in Nigeria. The result confirmed deceleration as evidenced from the aggregate of each agricultural subsector's GDP. Imoudu (2005) noted that declining performance of Nigerian agricultural sector is its sustained marginalization in the past three decades. This calls for an accelerate investment in agricultural sector to counter the sustained marginalization in the past. The accelerated investment is to fund and

develop human capital in agriculture, physical infrastructure, particularly rural areas and provision of agricultural credit and input subsidy.

Table 10: Summary of estimated quadratic equations in time variable for four sub-sectors GDP under different policy regimes 1961-2010.

Periods			Crop Subsector	Livestock Subsector	Forestry Subsector	Fishery Subsector
1st Policy Regime 1961-1970			Stagnation	Stagnation	Stagnation	Stagnation
2nd Policy Regime 1971-1985			Stagnation	Deceleration	Acceleration	Stagnation
3rd Policy Regime 1986-1994			Stagnation	Deceleration	Acceleration	Deceleration
4th Policy Regime 1995-2010			Stagnation	Acceleration	Acceleration	Deceleration
Aggregate 1961-2010			Deceleration	Deceleration	Deceleration	Deceleration

Source: computed by the researcher

An overview of the summary showed erratic pattern of growth. It is either stagnating decelerating or accelerating. The occasional deceleration, stagnation and acceleration growth showed that there were inconsistencies in growth pattern reflecting the nature of political economy in Nigeria. This was as a result instability and policy truncations by successive government. Adamu (2011) captured the essence of these periods of instability when he noted that the path to Nigeria agricultural development is littered with the carcasses of policies and programmes killed by one succeeding administration after the other. The urgent need to address the inconsistency in policy initiative and truncation in Nigeria in other to ensure growth and sustainability in the agricultural sector cannot be overemphasised. Successive government and policy makers should ensure that viable policies and programmes that were started by their predecessors are continued for the benefit of the masses. Table 10 also showed that liberalization policy regime is the best in growing agriculture GDP among the other policy regimes

CONCLUSION
Having evaluated the performance of various policy regimes towards agricultural subsectors' growth in Nigeria, the underlying fact established from the results imply that the performance of each of the agricultural subsectors has declined. There was inconsistency in growth pattern reflecting the volatile nature of Nigeria economy and successive policy regimes characteristic of reversion of predecessors' policies. Although none of the policy regimes could resuscitate agricultural sector, liberalization policy regime topped others as the best one for Nigeria. On the basis of the findings, the study suggests that policy makers should design a road map to ensure policy continuity which will drive investments and sustain liberalization.

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