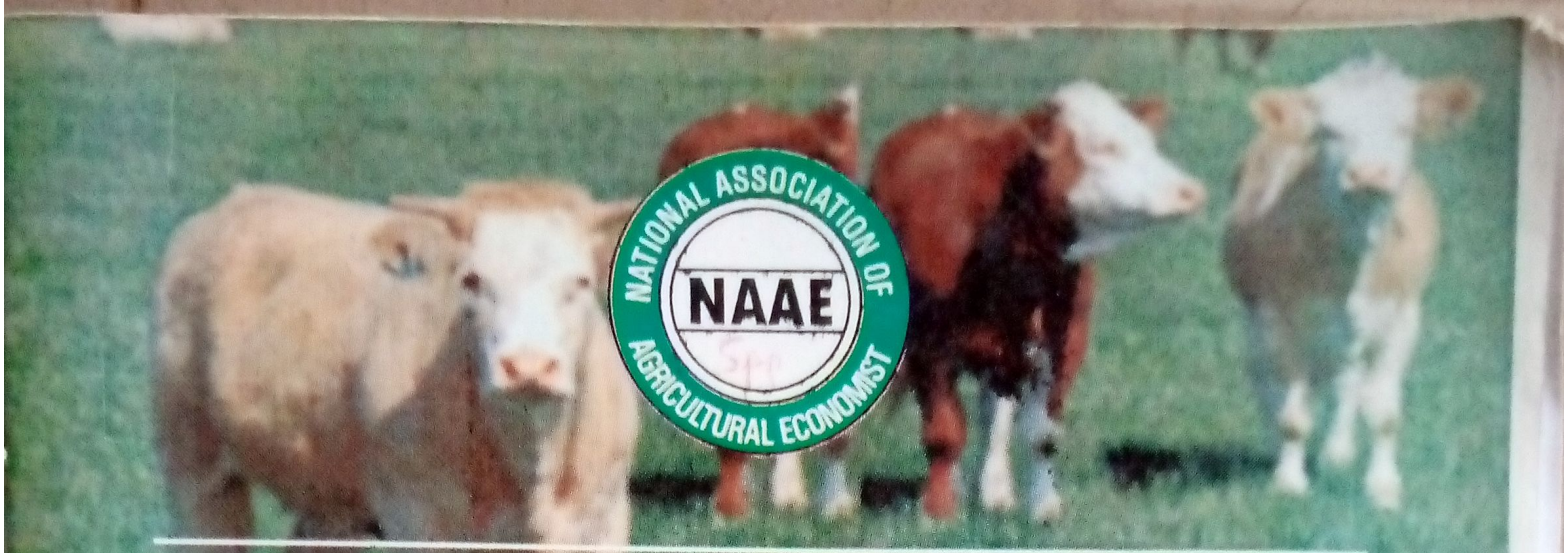

COMMERCIAL AGRICULTURE, BANKING REFORM AND ECONOMIC DOWNTURN: SETTING A NEW AGENDA FOR AGRICULTURAL DEVELOPMENT IN NIGERIA

PROCEEDINGS OF 11TH ANNUAL NATIONAL CONFERENCE OF NATIONAL ASSOCIATION OF AGRICULTURAL ECONOMISTS (NAAE)

HELD AT:
New Lecture Theatre, School of Agriculture and Agricultural Technology, Federal University of Technology, Gidan Kwano, Minna.

DATE:
30TH NOV., - 3RD DEC., 2010

EDITED BY:
J. N. Nmadu, M. A. Ojo
U. S. Mohammed, K. M. Baba
F. D. Ibrahim & E. S. Yisa

SCHEDULE FOR PRESENTATION OF PAPAERS

DAY ONE :1st December, 2010
GROUP ONE
Rapporteurs:
Chairman: Prof. K.M. Baba
Secretary: Dr.Likita Tanko
Power Point Operator: Mr. James Ndatsu

GROUP TWO
Rapporteurs:
Chairman: Prof. S.A. Rahman
Secretary: Mr. U.S. Mohammed
Power Point Operator: Mr. Y.L.Tauheed

IMPACT OF MONETARY POLICY ON VOLUME OF NIGERIA'S AGRICULTURAL EXPORT GROWTH: A DYNAMIC MODEL APPROACH

[1]ADEYEMI, R.A. (adeyemira@yahoo.ca), [2]H.U. MUHAMMED[3] and A.F. BUSARI
[1]Department of Crop Production, Federal University of Technology, P.M.B. 65 Minna –Nigeria
[2]Department of Agric. Economics and Extension, Federal University of Technology, P.M.B. 65 Minna -Nigeria,
[3]Department of Mathematics and Statistics, Federal University of Technology, P.M.B. 65 Minna -Nigeria,

Abstract
The ultimate objective of any fiscal policy is to entrench financial stability and stimulate economic growth. Major economic Sectors (agriculture, manufacture and industrial) are found to have responded drastically to changes that occur in financial policy. The volume of agricultural output are significantly affected by prices movements, which display curiously large variation across crops, regions and time period. Even, commercial interest rate, exchange rate and world prices of agricultural commodities might also seriously influence the seasonally output when such crops are pushed forward for involve international trade. The paper describes the major monetary regimes that have been implemented in the last three decades and its influence on agricultural output. The data used in this work was extracted from CBN Statistical Bulletin, Annual reports, and National Bureau Statistics Abstract of Statistics publications. In this paper, a dynamic regression model was constructed to estimating the real sector Nigeria's agricultural export volume in response to monetary policy by the financial regulator (i.e. Central Bank of Nigeria). The study revealed that exchange rate volatility has a negative effect on agricultural exports, while price volatility has a positive effect volume of agricultural trade. Thus, the more volatile the exchange rate changes, the lower the income earnings of farmers, which subsequently also leads to a decline in output production and a reduction in export trade.

Key words: Export prices, Monetary Policy Regimes, Agricultural Commodities, GDP

INTRODUCTION

Monetary policy can be defined as the instrument at the disposal of the monetary authorities to influence the availability and cost of credit/ money with the ultimate objective of achieving price stability (FRB, 2006). Its mandate may be saddled towards dual objective of price stability and sustainable growth. Monetary policy influences the level of money stock/ supply, interest rate, value and cost of credit in consonance with the level of economic activity, particularly agricultural trade in this context. Macroeconomic aggregates such as agricultural output, employment and prices are, in turn, affected by the stance of monetary policy through a number of ways including interest rate or money, credit; wealth or GDP contribution, and exchange rate channels, (Akhar, 1997; CBN,1995). The foreign exchange reforms (such as SAP in 1986) that facilitated a cumulative depreciation of the effective exchange rate were expected to increase the domestic prices of agricultural exports and therefore boost domestic production. This depreciation had resulted in changes in the structure and volume of Nigeria's agricultural exports as empirically reported by many researchers (Oyejide, 1986, Ihimodu, 1993; Osuntogun et al., 1993; World Bank, 1994). The depreciation also increased the prices of agricultural exports and studies have shown a marked increase in volume of agricultural exports over the years. However, the volatility, frequency and instability of the exchange rate movements since the beginning of the floating exchange rate raise a concern about the impact of such movements on agricultural trade flows.

In the quest for stability of the exchange rate, the Nigerian monetary authorities tried several bidding systems, including the Dutch auction system (DAS) and the marginal rate system. An attempt to ensure viability in the market led to many amendments of the rules, interventions by Central Bank of Nigeria, and opening of different foreign exchange windows for operations during this period. Despite this, the fluctuating rates of the exchange rate continued to be an issue of concern to the authorities. For example, the naira exchange rate, which stood at ₦6.7178 = $1 during the month of January 1989 depreciated to ₦7.5871 by March 1989. The rate strengthened progressively from W7.5808 = $1 in April to W7.1388 = $1 in July 1989 after a series of tight monetary policy actions had been taken. For the ongoing, a dynamic model is proposed to capture this trend of agricultural export trade in relation to price movements, which appropriately considers the major characteristics and the dynamics of the associated adjustment process.

The major goal of this study is to address these neglected issues. The paper intends to provide an empirical basis for the analysis of the effect of price and exchange rate volatility on the volume of agricultural exports. This study also intends to evaluate the nature and extent of the impact of price and exchange rate volatility on agricultural export trade.

METHODOLOGY

Prior to the banking sector consolidation exercise that concluded in December 2005, the framework for monetary policy in Nigeria had witnessed some transformation. This included the shift from the use of direct monetary policy control to indirect (market- based) monetary management, and the swift from short-term framework to a two term-medium term framework in the conduct of monetary policy.

Prior to the introduction of the Structural Adjustment Programme (SAP) in mid 1980s, the monetary policy framework place emphasis on direct monetary control. The major objectives of this policy during this regime are to promote rapid and sustainable economic. The instruments adopted were mostly credit ceiling with preference to some sectors of the economy such as agriculture, manufacturing and construction. During this period, agricultural output was greatly influenced by prices among other factors and the depreciation of the naira and abolition of the commodity boards in 1986, which resulted in an overall increase in production of exports. Table 1 presents the output performance of the major agricultural product groups at the commencement of Structural Adjustment Policy (SAP) in as compared with the pre-SAP period. The crops included in each product group accounted for at least 60% of all the exported crops in the group. The two periods shows that export crops performed best, with the average output of the group increasing by about 42% over the pre-SAP period.

The economic deregulation embodied in the SAP culminated a paradigm shift from the hitherto repressive direct monetary control method to an indirect approach anchored on the use of market instruments in monetary management. This was borne out of desire to eliminate the distortions and inefficiency in the financial system control caused by the prolonged use of administrative and endangered competitiveness among banks and other operators in the financial system. Prominent examples of the instruments of indirect monetary control are: open market operations, discount rate and so forth. This regime has led to a period in which the staple crops group recorded about 38% increase, while forestry and livestock groups were hardly influenced and the output of fishery fell by about 15%. As a result of very high increases in the nominal producer prices during the SAP era, coupled with the moderate output increase of most crops during the 1986-1994 periods, the nominal incomes of producers rose substantially, as shown in Table 1.

Two major policy regimes of short and medium – term frameworks can be identified. In consistent with the broad objectives of the monetary policy, a number of targets and instruments were adopted during the short-term monetary policy framework (1986-2001). OMO, which was conducted using Nigerian Treasury Bill (NTBs) was implemented by the cash reserve requirement (CRR) and the liquidity ratio (LR). This policy led to the unification of official and interbank exchange rates in 1999. Medium term regime commenced in 2002 and it aimed at freeing monetary policy from the problem of time inconsistency and minimizing over-reaction due to temporary shocks. The measures were taken to strengthen the banking sector and consolidate the gains of the monetary policy included in the 13 –point reform agenda in the banking sector in July 2004. Referring to table 1, the impact of this reform on agricultural production can be seen. The prices of Nigeria's major agricultural commodities in the world market trended upwards in 2003. At 96.3 (1990=100), the dollars based, all commodities price index grew by 4.4 percent over the level in the proceeding year. The increased in price of other commodities ranged from 2.9 percent for copra to 5.5 percent for cotton. Improved international demand, coupled with tight supply situations, largely accounted for the strength of the world commodities. Domestic producer prices of Nigeria's major agricultural commodities increased during 2003. Of the thirteen monitored commodities, ten registered increases, while three recorded declines, relative to their levels in 2002. The increase in prices was attributable, partly, to costs of transportation as a result of upward adjustment in the prices of petroleum products and the poor conditions of the rural roads, which increased the cost of evacuating of farm produce to the urban centers (CBN, 2007).

The dynamic structure of a time series regression model can be more complex than a multiple linear regression as it possesses lagged values in both the regressand, y_t, and the regressors, x_t. The dynamic regression model is of the form

$$y_t = \theta_1 y_{t-1} + x_t'\varphi_0 + x_{t-1}'\varphi_1 + \varepsilon_t \qquad (1)$$

where y_t is modeled as a function of y_{t-1}, x_t, and x_{t-1}. This model is denoted an autoregressive distributed lag, or ADL, model. It is the workhorse in the modeling of dynamic relations between variables. The above models are useful in different contexts and later in the next section we go into more details with the interpretations of the models. Detailed discussion, properties and estimation method on time series regressions can be found in literatures (Hamilton,1994; Hayashi, 2000; Davidson, 2001, Wooldridge, 2003) .

For the purpose of this work, we adopted model used in the majority of previous studies is based on a linear regression form:

$$Q_t = \alpha_0 + \alpha_1 X_t + \alpha_2 Y_t + \alpha_3 Z_t + \varepsilon_t \qquad (2)$$

where Q_t, is the quantity of exports or imports, X_t is a measure of real economic activity (GNP, or index of Agricultural production), Y_t, is a measure of relative prices relevant to the analysis, Z_t is a measure of volatility, and ε_t is a random error. In this model, a statistically significant and negative coefficient for α_3 indicates the existence of a negative relationship between volatility and trade. The most notable variations of this methodology are by Koray and Lastrapes (1989), who use the vector autoregressive (VAR) model, and Kroner and Lastrapes (1991), who use the generalized autoregressive conditional heteroscedasticity (GARCH) in mean model.

Suppose there is a stochastic sequence $\langle X \rangle_{t=1}^{N}$ that is stationary and invertible. To identify which process to fit on $\langle X_t \rangle$, consider its autocorrelation function (ACF) , and partial autocorrelation (PACF), α_{kk}. If the PACF cuts off after a lag P and its ACF decays exponentially, then the process is identified as an autoregressive (AR) model of order ***p***, but if the ACF cuts off after lag ***q*** and its PACF decays exponentially, then the process is a moving average of order ***q*** . But if nether the ACF nor PACF cuts off, then we have a process which can describe as autoregressive moving average (ARIMA) process of order (***p, q, d***); the term d stands for the order of differencing use to attain the stationarity (Chatfield, 1985).

The following equations are considered for the estimation of the model:

$$\Phi(T)S_t^* = \theta(T)\varepsilon_{st} \qquad (3)$$

Where $\Phi(T)$ is constrained to unity.

$$D_T(m) = E[S_t^*(m)/S_t^*(m)]_{m=1} \quad (4)$$

$$\alpha_x(T)X_t = \theta_x\varepsilon_t + \beta_x(T)\Delta P_t + \theta_x(T)\Delta Y_t + \delta_x D_{T+1} + \varepsilon_{xt} \qquad (5)$$

$$\alpha_x(T)P_t = \theta_p\varepsilon_t + \beta_p(T)\Delta P_t + \theta_p(T)\Delta Y_t + \delta_p D_{T+1} + \varepsilon_{pt} \qquad (6)$$

Where:

ε_t = the estimate of ε_{st} in equation (4)

Δ = first difference operator

X_t = real value of agricultural exports from Nigeria to the rest of the world at time t in ₦ million. This is a nominal value of agricultural exports deflated by GDP deflator.

P_t = Price of exports denominated in foreign currency i.e. producer prices as quoted by Central Bank of Nigeria.

S_t = Exchange rate in terms of foreign currency per unit of home currency

Y_t = vector of the exogenous variables such as GDP and a constant level.

D_T = volatility variable

ε = white noise process

This paper utilizes data extracted from CBN Statistical Bulletin and National Bureau of Statistics (NBS) Annual Abstract of Statistics. Data on price indexes, exports, and exchange rates were also obtained from the Central Bank of Nigeria's (CBN) *Statistical Bulletin, Economic and Financial Review*, and annual reports and statements of accounts, as well as Trade Summary of the Federal Office of Statistics and Abstracts of Statistics of FOS. Foreign reserves and GDP figures were obtained from the International Financial Statistics of the IMF. Exchange rates were obtained from CBN reports in quarterly series.

RESULTS AND DISCUSSION

Agricultural exports were assumed to be influenced by foreign reserves, exchange rate and price of exports. Prices, exchange rate and GDP were conventionally treated as determinants of export supply. In export equations, price and exchange rate volatilities were estimated and incorporated as independent variables.

From equation (4), we first estimate the volatility coefficients of the export price and the exchange rate, which were later plugged back into equations (5) and (6) to fit the models.

(1) $P_{ext} = \varepsilon_t$ = -0.701(0.092) for foreign exchange

(2) $P_{pt} = \varepsilon_t =$ $P_{ext} = \varepsilon_t$ = -0.531(0.102) for export price index

(1) and (2) are coefficients of MA models with their standard errors in brackets

The second stage involves the estimation of independent equations for real export earnings from agricultural trade, exchange rate, and export price local. Explanatory variables in the model are exchange rate, export prices (in foreign currency), exchange rate, and price and exchange rate volatility.

Table 1: Equation fitted: to Real export earnings: Φ export price + θ exchange rate + β volatility of export price

Coefficient	value	T-value	Prob.
Φ	0.087	4.21	0.000
θ	-2.043	-2.91	0.042
β	0.022	3.21	0.003
Model signf.(F) level	107.34	0.000	

Table 2: Equation fitted to Real export earnings: Φ export price + θ exchange rate + β volatility of exchange rate

Coefficient	value	T-value	Prob.
Φ	0.288	6.62	0.000
θ	-0.533	-2.91	0.221
β	-26.082	-3.72	0.002
Model signf.(F) level	115.34	0.000	

Table 3: Equation fitted to Real export earnings: Φ export price + θ exchange rate + β_1 volatility of export price + β_2 volatility of exchange rate

Coefficient	value	T-value	Prob.
Φ	0.128	6.962	0.000
θ	0.333	0.441	0.682
β_1	0.011	5.67	0.000
β_2	-55.132	-4.65	0.000
Model signf.(F) level	175.34	0.000	

The first model examined the effect of export price and volatility on export trade, while the second focused on the effect of exchange rate volatility. The third model examined the combined effect of both variables on major agricultural exports from Nigeria to her major trading partners. The three equations were estimated for real export earnings from agricultural sector. For all the equations, the explanatory variables determined the agricultural trade earnings and prices in all cases by well over 70% as indicated by the adjusted R^2, although some of the coefficients are not statistically significant. All the volatility coefficients are in all cases statistically significant and the regression models used are appropriate and adequate as depicted by the probability of their F-statistics. Generally, model specification is adequate for modeling the agricultural trade and price indexes in the presence of heteroskedasticity. This is justified by the power of the models fitted.

CONCLUSION

The study has also shown that the monetary policy, though beneficial in terms of price increases of agricultural exports, has also resulted in a high level of price and exchange rate fluctuations. The monetary authorities should adopt a mechanism that will lead to the stability of the exchange rate. Erratic changes in the exchange rate have a long-term negative effect on production of agricultural exports. The government should monitor the marketing system of agricultural exports to ensure that farmers are paid fully by the buying agents so that the full benefit of production increases resulting from liberalization can be reaped.

REFERENCE

Akhar, M.A. (1997) "Understanding Open Market Operations", Public Information Department, Federal Reverse Bank of New York

Chatfield C. (1984) "The Analysis of Time Series" (An Introduction). Chapman and Hall

Central Bank of Nigeria (1995) CBN Briefs 1995 Series June

---------- CBN Briefs 1998 Series June.

---------- Annual Reports and Statements of Accounts, various years

---------- (2004) 'Monetary, credit, Foreign trade and Exchange Policy Guidelines for fiscal 2004/2005, (Monetary policy Cirvular No. 37) January

Central Bank of Nigeria(2006) "Statistical Bulletin" Volume 17, Dec.2006

Central Bank of Nigeria(2007)"Annual Report and Statement of Accounts"

Davidson, James (2001) "Econometric Theory" Blackwell Publishers (Reprinted,2001).

Hamilton, James D. (1994) "Time Series Analysis" Princeton University Press.

Hayashi, Fumio (2000) "Econometrics" Princeton University Press.

Federal Reserve Board (2006) "Meeting Everyone's Needs- National Economic Empowerment and Development Strategy" Nigerian National Planning Commission, Abuja,

Osuntogun, A., C.C. Edordu and B.O. Oramah (1993) "Promoting Nigeria's non-oil export: An analysis of some strategic issues" Final report. African Economic Research Consortium, Nairobi, Kenya.

Oyejide, T.A. (1986) "The effects of trade and exchange rate policies on Agriculture in Nigeria" Research Report 55, International Food Policy Research Institute, Washington, D.C.World Bank. 1994. Nigeria Structural Adjustment Programme: Policies Implementation and Impact. World Bank Report No. 130534JNI.

Wooldridge, J. M. (2003) "Introductory Econometrics" A Modern Approach, 2nd edition, South Western College Publishing.

National Bureau of Statistics (2006) "Annual Abstract of Statistics publications", National Bureau of Statistics

Table 1: Index of Agricultural Production by type(1990=100)

Regime	Year	Stapes	Livestock	Fishery	Forestry	Other crops
	1980	45.35	53.91	198.19	80.77	73.29
	1981	46.15	47.80	171.45	81.85	74.33
	1982	48.26	56.27	176.74	81.23	72.81
	1983	46.99	61.17	189.79	76.08	64.60
Pre-SAP	1984	52.8	58.50	129.20	76.85	69.01
	1985	54.54	63.65	80.49	79.08	71.64
	1986	58.08	68.81	89.79	81.56	79.85
	1987	44.51	85.68	80.63	91.19	74.68
	1988	46.82	83.44	88.57	93.1	79.58
SAP	1989	94.29	97.09	115.24	96.18	94.65
	1990	100	100	100	100	100
	1991	120.76	132.52	108.89	102.01	104.66
	1992	134.23	131.37	108.89	104.34	106.73
	1993	140.61	133.21	81.27	106.5	100.83
	1994	146.17	135.28	86.67	109.24	100.76
	1995	150.61	140.95	100.32	109.3	99.19
	1996	157.39	145	115.56	112.24	113.46
(Short-	1997	162.25	148.7	128.57	113.32	118.21
term)	1998	166.89	149.46	136.51	114.04	125.82
	1999	172.71	152.99	140.63	116.32	129.71
	2000	178.51	157.21	146.03	118.11	134.04
	2001	157.5	199.5	157.00	120.4	69.9
(Medium-	2002	164.1	208.9	158.10	121.3	72.8
term)	2003	175.9	225.5	160.50	123.1	76.5
	2004	186.9	238	172.10	125.7	82.2
	2005	199.5	250	182.10	132.6	88.6
	2006	215.1	264.72	73.28	150.9	162.2

Source: Derived from data compiled by National Bureau of Statistics (NBS), Federal Office of Statistics(FOS).Central Bank of Nigeria's annual Statistical Bulletin, 2006 Export crops - Cocoa, groundnuts, cotton, palm oil and palm kernel. Staples - Maize, millet, sorghum, rice, wheat, cassava, yam and beans Forestry – Round-wood, saw-wood, wood based panel Livestock - Poultry, goat meat, beef and eggs Fisheries - Artisan, coastal and brackish water, catches and land, lakes and rivers