

AGRICULTURAL SUPPLY RESPONSE TO TRADE AND EXCHANGE RATE REFORMS IN NIGERIA

BY

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Statement of Problem

- A twist in the economic fortune of two leading sectors
- Increasing realisation of the need to diversify
- The apparent manifestation of the danger in the monoculture nature of a given economy and
- The warning from oil experts of possible exhaustion of oil
- Policies that have been used include fiscal, monetary, trade, exchange rate and general macroeconomic policies.
- Yet Nigeria is a huge net importer of agricultural commodities.
- In 2011, (FAO) reports show the country agricultural import was approximately \$3.7billion while the country's agricultural export was a meagre \$600 million

- Even with the agricultural transformation agenda of the previous administration, the country's importation of rice, wheat, sugar and fish refuses to abate.
- Obviously there is a disconnection between the policies and the result.
- Of these policies, two are germane to the issue of agricultural production and export: these are the trade policy and the exchange rate policy.
- Their importance stem from their influence on both agricultural inputs and outputs prices.
- Given the noticed problem, the questions are:
- What are the impact of trade and exchange rate policies on agricultural supply?
- What roles do agricultural output and input prices play in enhancing farmers' incentives to produce and export?
- How stable and appropriate have the successive government policies on agriculture been?
- What are the impacts of institutional environment on the output of agricultural products?
- These questions and many others led to the objective of the study

Objective of the Study

- The broad objective of this study is to assess the response of agricultural output and prices to trade and exchange rate reforms in Nigeria.

Justification for the Study

- On policy ground- incessant changing of the policy
- Theoretical justification- most theories emphasises more of output prices than inputs. They seem also to be silent on the pass through of both trade and exchange rate policies. Also they emphasise more of the price factors, giving less attention to non-price factors.
- On Methodology- Several methodologies have been used: Descriptive analysis, OLS, 2SLS, Gravity Model, ATPSM, SWOPSIM, Quadratic Programming etc and sparsely used the most potent techniques of handling issues of this nature
- On the ground of empirical: A wide range of results have been given- this put policy makers at crossroads. The implication of which is further studies need to be carried on.

Agricultural Sector Performance in Nigeria

- Table 1: Agriculture's Contribution to Economic Development**

Indicators / Years	1970-1979	1980-1989	1990-1999	2000-2014
Agriculture (%) of GDP	33.6	33.5	31.3	25
Agriculture (%) of Non-Oil GDP	48.6	52.4	54.0	55.9
Agricultural Export (%) of Export	47.6	41.9	21.5	17.7
Agricultural Export (%) of Non Oil Export	77.8	89.7	86.3	71.3
Agricultural Import (%) of Import	10.6	15.21	10.8	11.76
Agricultural Import (%) of Non Oil Import	10.9	16.29	13.80	43.82
Growth Rate Of Percentage Of Agric Population In Total Population	-	-	-21.2	-26.9

Agric's contribution to GDP has been on the decline. Agric export as % of export also. The growth rate of agric population in total population is also declining

Agricultural Export in Nigeria

- **Table 2: Trend of Agricultural Export Performance in Nigeria 1970-2014**

Year	Volume of Agricultural Export (MT)	Value of Agricultural Export (million naira)	Agricultural Share in Total Export Earning (%)	Share of Agriculture in Non-oil export (%)	Share of Agricultural Export in GDP (%)
1970-1974	924.1	241.2	15.0	69.5	32.8
1975-1979	418.9	352.2	4.9	69.6	22.3
1980-1985	208.3	429.3	3.1	87.6	37.1
1986-1994	326.8	2337.9	3.0	58.2	39.7
1995-1999	372.5	16216.8	1.5	64.2	39.6
2000-2014	443.0	30285.7	1.0	73.0	40.8

Agric export was at its highest in early 70s. Since then it has been declining until year 2000 when some improvement began to manifest.

Agricultural Import

- Table 4: Trend of Agricultural Imports in Nigeria 1970-2014**

Year	Import Value (%age growth)	Import (% of GDP)	Agricultural Import (%age growth)	Agric Import (% of Total Import)	Agric Import (% of Non-oil Import)
1970-1974	-	13.4	-	8.7	9.5
1975-1979	0.8	22.6	0.9	10.9	12.4
1980-1985	0.3	20.0	0.5	15.7	18.6
1986-1994	0.9	30.6	0.7	10.0	11.2
1995-1999	0.9	37.2	0.9	15.0	17.6
2000-2014	0.8	39.2	0.7	12.8	14.7

The highlight of table 4 is that agric import as a %age of GDP has been increasing since the 1970s.

Policy Environment for Agricultural Production

- **Table 5: Schema of Trade Policy Reforms from 1960 to 2014**

S/N	Year	Policy
1	1960s	Restrictions on importation
2	1970	Restriction lifted especially on machinery, spare parts, agricultural equipments and other manufacturing equipments.
3	1971-1972	Restrictive policy re-introduced.
4	1973-1974	Reduction in most tariffs, especially on food.
5	1977/1978	Further trade restrictions were introduced.
6	1982	Restrictive trade policy continued.
7	1986	Adoption of Structural Adjustment Programme
8	1995	Trade liberalization policy pursued.
9	1999-2014	Trade policy enshrined in the NEEDS, the 7-Point Agenda and the Transformation agenda

The essence of trade policy is regulates external trade in line with the domestic requirements. The policies above have been adopted to achieve the country's macroeconomic goals. Mostly revenue generation and protection of the domestic industries.

Exchange Rate Policy

- **Table 6: Schema of Reforms in the Exchange Rate Management in Nigeria**

S/N	Year	Event
1	1959-1967	Fixed parity solely with British Pounds
2	1968-1972	Included the US dollars in the parity exchange
3	1973	Revert to fixed parity with British pounds
4	1974	Parity to both Pounds and Dollars
5	1978	Trade (import) weighted basket of currency approach
6	1985	Referenced to the US dollars
7	1986	Adoption of Second Tier Foreign Exchange Market (SFEM)
8	1987	Merger of First Tier and Second Tier market
9	1988	Introduction of interbank foreign exchange market
10	1994	Fixed exchange rates
11	1995	Introduction of the Autonomous Foreign Exchange Market (AFEM)
12	1999	Re-introduction of IFEM
13	2002	Re-introduction of Dutch Auction System
14	2006 till date	Introduction of wholesale DAS

Agricultural Policies and Programmes from 1960 till Date

- Table 7: Schema of Agricultural Policies and Programmes from 1960 till Date**

S/N	Year	Policy			
1	1959	Farm Settlement Programmes (FSP)	9	1992	National Agriculture Land Development Authority (NALDA)
2	1972	National accelerated for Food Production Programmes (NAFFP)	10	1994/1996	Family Support Programme (FSP)/Family Economic Advancement Programme (FEAP)
3	1974	Agricultural Development Programmes (ADP)	11	2002	National Special Programme on Food Security (NSPFS)
4	1976	Operation Feed the Nation (OFN)	12	2003	Roots and Tuber Expansion Programme
5	1976	River Basin Development Authorities (RBDA)	13	1999 till date	The National Fadama Development Project I, II and III
6	1980	Green Revolution (GR)	14	2007	Agriculture in the 7-point agenda of Yaradua
7	1986	Directorate of Food, Road and Rural Infrastructure (DFFRI)	15	2010	Bank of Agriculture (BOA)
8	1987	Better Life for Rural Women (BLRW)	16	2011-till date	Agriculture in Transformation agenda

LITERATURE REVIEW

- **Theoretical Literature**
- The impact of exchange rate on output depends on the movement of exchange rate. Conventionally depreciation of the domestic currency makes the export relatively cheaper for foreigners and makes import relatively more expensive for domestic consumers. This helps increase the country's export and switches demand towards domestically produced goods and therefore shifts the aggregate demand curve to the right (Dornbusch, 1988). Schematically, transmission mechanism is presented thus:

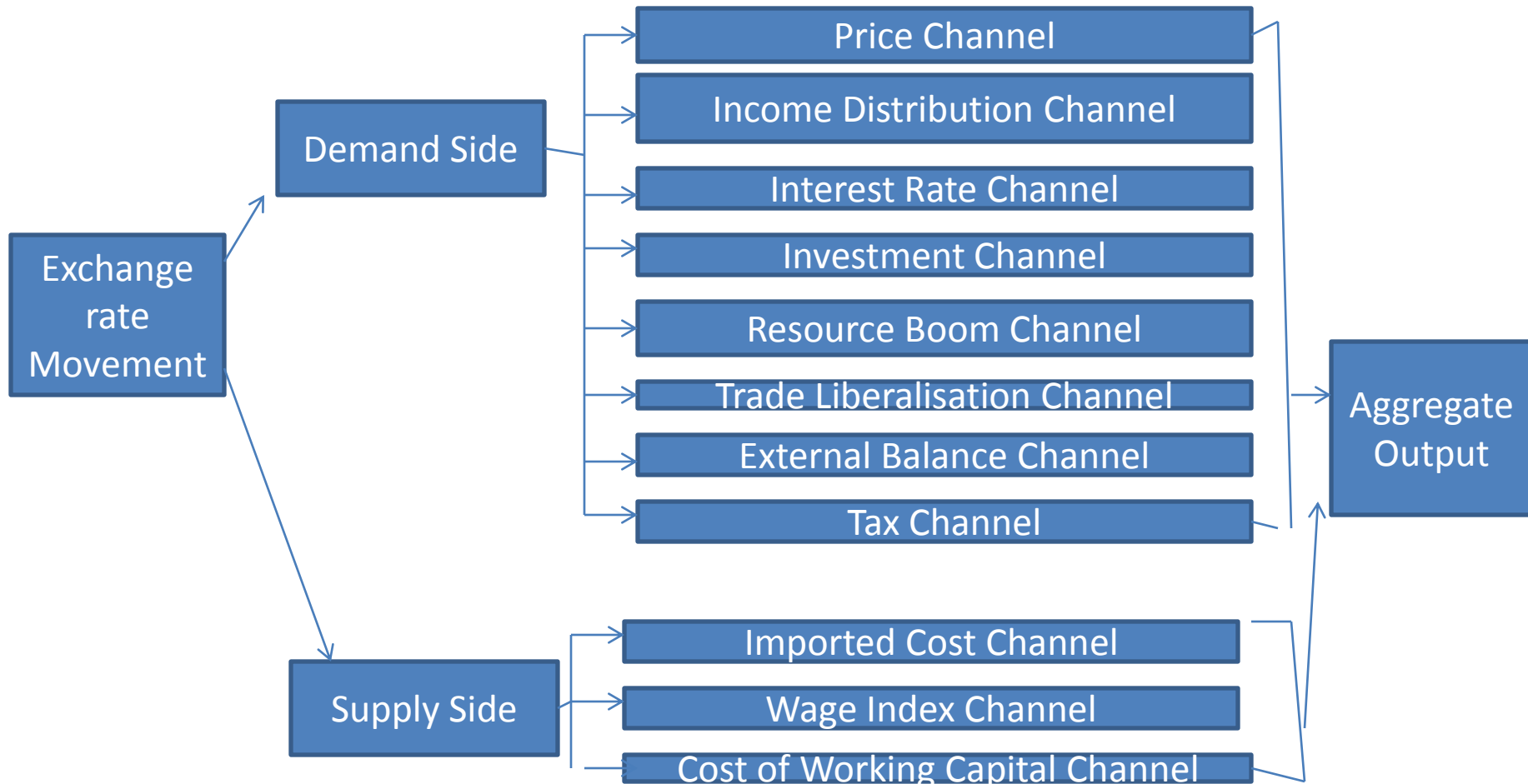
Depreciation	Weaker Domestic Currency	Export Cheaper
Import Expensive	Export	Domestically produced goods

In the case of trade policy variable of tariff, the objective of tariff increase is similar to that of depreciation of exchange rate.

However this textbook model is not uniformly supported by prior theoretical research or actual historical experience. As a matter of fact, the theoretical views on the impact of exchange rate movements has not enjoyed consensus among economics scholar.

Channels of Exchange Rate/Output Movement

- Stylised Representation of the Transmission Mechanism of Exchange Rate to Output



Review of Methodology

Techniques used by Previous authors

- Descriptive Analysis
- The Ordinary Least Square
- The Two Stage Least Square
- The Generalised Method of Moment
- The Gravity Model
- The Agricultural Trade Policy Simulation Model (ATPSM)
- Generalised Autoregressive Conditional Heteroskedasticity GARCH and E-GARCH
- The Static World Policy Simulation Model and
- Quadratic Programming

The Flaws Detected From the Methodologies

- Some of the methodologies not conforming with modern quantitative approach
- Some are only useful for single equation model
- Some are limited in scope because of the number of variables it can accommodate
- Some are useful for solving analyses on regional integration.

STRUCTURAL VECTOR AUTOREGRESSION (SVAR)

The study is about agricultural supply response; SVAR entails examination of IRFs of variables that make up the model.

SVAR is also useful for describing the dynamic behaviour of economic and financial time series and for forecasting

Empirical Literature

- Empirical evidences from most studies differ on many grounds. The differences could be from the theory driving the study, the methodology, the assumptions about the model and the type of data among other issues.
- Chamber and Just (1979) concludes that the response of exchange rate of both price and quantity exported can be greater (or less) than the overly restrictive model suggests.
- Fajardo, McCarl and Thompson (1981) found that a 15% ad valorem export tax imposed on coffee, sugar, tobacco habano, cotton and sesame led to a reduction in the exports of only cotton and sugar.
- Bautista (1993) found that a 10% increase in real exchange rate boost the price of agricultural products by slightly less than 4%. The study also estimated the elasticity of relative prices of agricultural products with respect to export tax variable and import tariff variable. While for export tax variable is slightly more than 3%, that of import tariff is slightly more than 4%. The sign in either case is positive showing that relative agricultural prices respond positively to a rise in both export tax and import tariff.
- In Nigeria, Adubi and Okumadewa (1999) shows that exchange rate volatility have a high level of negative impact on export, but positively affect export earnings.

Theoretical Framework and Methodology

- The study adopted the model of Gylfason and Risager (2003). The model incorporates the link between devaluation, foreign interest payments and the current account into a fairly general macroeconomic model in which exchange rate changes influence aggregate demand through exports, imports and expenditures as well as aggregate supply via cost of imported factors of production. The model starts by describing the production function of a typical economy as:

$$q = q(e, n) \dots \dots \dots (1)$$

$$q = \theta_e e + \theta_n n \text{ where } \theta \equiv \theta_e + \theta_n \leq 1 \dots \dots \dots (2)$$

$$\sigma = \frac{(n - e)}{(E - W)} \dots \dots \dots (3)$$

$$n = \left(\frac{1}{\theta} \right) q - \left(\frac{\theta_e \sigma}{n} \right) (E - W) \dots \dots \dots (4)$$

$$y = q - \left(\frac{E}{P} \right) n - \left(\frac{E}{P} \right) r^* D^* \dots \dots \dots (5)$$

$$y = \left[\frac{(1 + \mu)}{(1 + \theta_n)} \right] q - \left[\frac{\theta_n (1 + \mu)}{1 - \theta_n} \right] (E - P + n) - \mu (E - P) \dots \dots \dots (6)$$

$$P = \left(\frac{\theta_e}{\theta} \right) W + \left(\frac{\theta_e}{\theta} \right) E + \left(\frac{1 - \theta_e}{\theta} \right) q \dots \dots \dots (7)$$

$$y = \left[\frac{\theta + \mu}{\sigma} \right] q + \left\{ \frac{[\theta_n (1 + \mu) \theta_e (1 - \sigma)]}{(1 - \theta_n) \theta} + \frac{\mu \theta_e}{\theta} \right\} (E - W) \dots \dots \dots (8)$$

$$P = b_1 y + b_2 E + b_3 W, \text{ where } b_1, b_2, b_3 > 0 \dots \dots \dots (9)$$

Model Specification

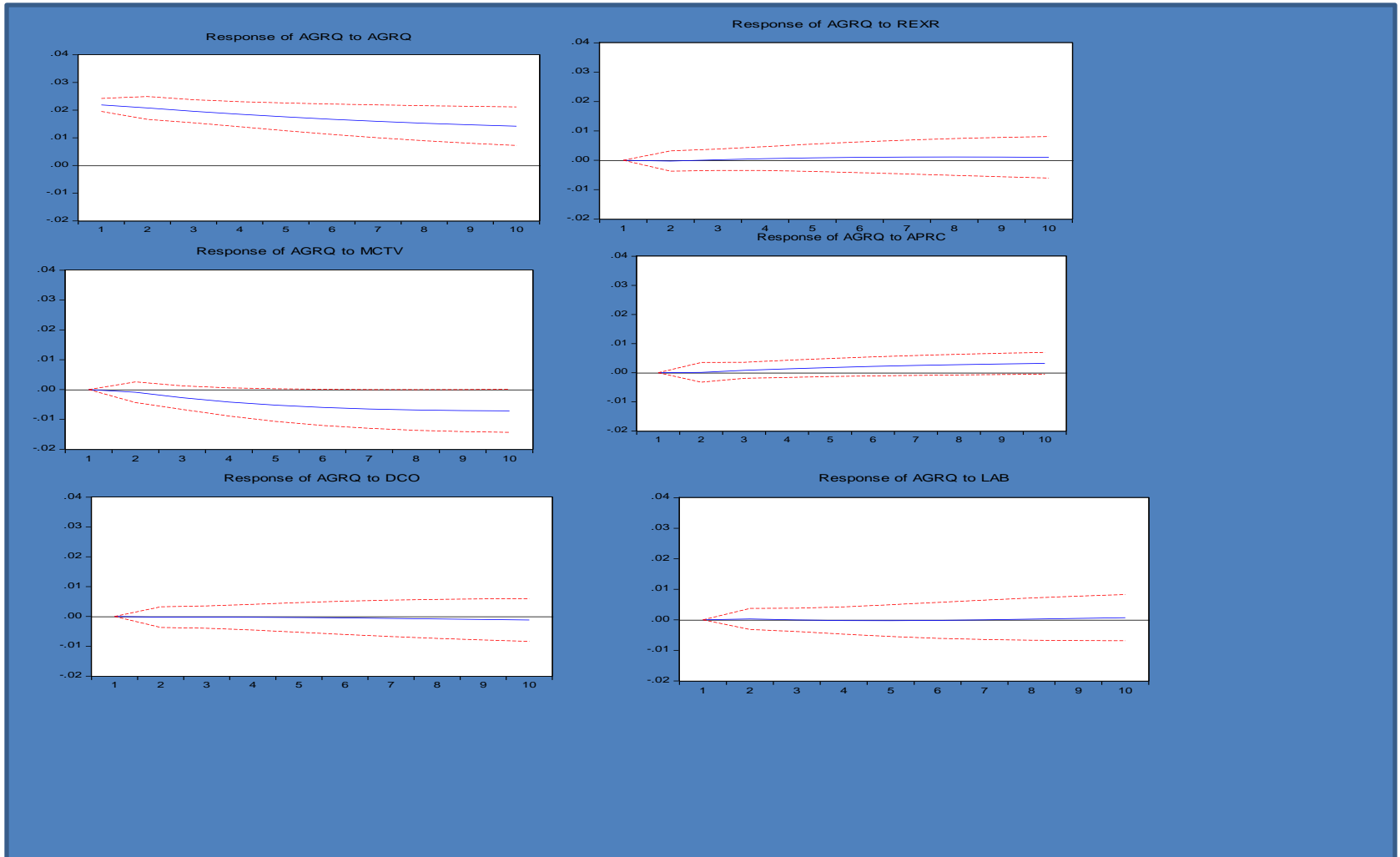
- $AGRQ_{it} = f(APRC_{it}, REXR_{it}, DCO_{it}, MCTV_{it}, ACR_{it}, LAB_{it})$

Empirical Analysis

- **Preliminary Analysis**

- **Statistical Properties of the Variables-** One important statistical characteristic of the variables in the table below is the near equality of both the mean and the median for all the variables. This implies a near perfect normal distribution data sets, a common assumption underlying many statistical tests.
- **Unit Root Test Using DF-GLS and NG-Perron :**DF-GLS results shows that of the 37 variables three are integrated at order zero, while 34 are integrated at order one. For NG-Perron 32 are I(1) while 5 are I(0)
- **Correlation Coefficients of the Variables:** Three of the variables namely real exchange rate, acreage and average agricultural price (REXR, ACR and APCR respectively) are positively related to total agricultural output and equally significant too, while the other three namely agricultural term of trade, degree of commercial openness and labour (ATOT, DCO and LAB respectively) are negatively related to agricultural output. However, the negative relationship between the DCO and AGRQ appear to be insignificant.

Impulse Response of Aggregate Agricultural Output



- Figure 5.11 presents the impulse responses of aggregate agricultural output to exchange rate and trade policy. The other variables that make up the system of SVAR include the average price of agricultural commodity (APRC), land used for agricultural purposes represented by acreage (ACR), agricultural labour force represented by (LAB) and cost of agricultural machinery (MCTV). The first figure of Figure 5.11 shows the response of agricultural output to its own shock. A one standard deviation shock to agricultural output led to a fall in agricultural output from the first period to the tenth period, albeit positive movement.
- The second figure of Figure 5.11 shows the response of agricultural output to the shock from REXR. When the impulse was real exchange rate, response of agricultural output was slightly positive. This was an indication of a positive relationship between REXR and agricultural output, although a very slight positive relationship. In the third figure, the response of agricultural output to MCTV, was such that a one standard deviation shock in MCTV makes the agricultural output fall till the third period, and from the 4th period, it maintained a constant negative till period 10. This is an indication of a negative relationship between MCTV and agricultural output.
- The fourth and fifth figures of figure 5.11 explain the impact of the average price of agricultural commodity and the DCO on agricultural output. A one standard deviation shock to average price of the commodity shows that agricultural output did not respond to shock in the price between period one and two. From period three upward to the tenth period, agricultural output steadily shows a positive response to the shock in the price of agricultural commodity. Trade policy variable of DCO in the figure above shows that an insignificant negative relationship exists between agricultural output and the DCO. This type of relationship was witnessed between agricultural output and other non-price variables of land and labour.

Variance Decomposition

Period	S.E.	AGRQ	REXR	MCTV	APRC	DCO	LAB	ACR
1	0.022	100.0000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.030	99.888	0.007	0.087	0.002	0.005	0.009	0.002
3	0.036	99.289	0.008	0.623	0.055	0.007	0.006	0.013
4	0.041	98.258	0.026	1.522	0.150	0.009	0.008	0.027
5	0.045	96.980	0.057	2.616	0.285	0.014	0.010	0.038
6	0.048	95.594	0.093	3.785	0.450	0.022	0.010	0.045
7	0.051	94.127	0.128	4.950	0.638	0.035	0.009	0.048
8	0.054	92.828	0.159	6.059	0.842	0.054	0.010	0.048
9	0.057	91.535	0.182	7.083	1.057	0.081	0.016	0.045
10	0.059	90.329	0.197	8.009	1.278	0.115	0.030	0.042

- Table 5.28 shows the reports of variance decomposition of the first ten periods' horizon into the future. The table shows that in the first period, variations in output were wholly explained by own shocks. This implies that variations in output were hardly affected by other variables in the first year. The table also shows that beside own contribution, variations in aggregate output can only be attributed marginally to variations in labour, DCO, land and price. From the table, and average price of the commodity were the most significant variables that affected variation in aggregate output apart from its own shock. They accounted for 3.75% and 0.45% respectively in period 6 and by period 10, it was 8.01% and 1.28%, respectively. The major implication of this finding is that price factors were more significant in explaining the variations in aggregate output than non- price factors.

Summary, Conclusion and Recommendation

- **1.** Real Exchange Rate, Average price of the agricultural commodity and degree of commercial openness were found to be positively related to agricultural supply.
- **2.** The implication is that nominal exchange rate is negatively related to agricultural supply. The more the naira depreciates the less the agricultural output.
- **3.** The positive average price is consonant with the law of supply that the higher the price the higher the quantity supplied.
- **4.** The positive DCO means the more we open our trade, the more the output of agriculture
- Labour is negatively related to agricultural output, while land is positively related to it.
- Cost of agricultural machinery is also negatively related to agricultural supply

Policy Recommendation

- Exchange rate stability to aid farmer's planning
- Improved technology and seedlings more paramount than labour intensive technique of production

- **THANK YOU
FOR
LISTENING**