Economic and Financial Review

Volume 40 | Number 3 Article 12

9-2001

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Dayo Phillip
University of Agriculture, Abeokuta

40-58 CBN ECONOMIC & FINANCIAL REVIEW, VOL. 40 NO. 3

ANALYSIS OF FORMAL LENDING TO THE AGRICULTURAL SECTOR IN NIGERIA: 1978–98

By

Dayo Phillip

ABSTRACT

Towards the attainment of the goals of the Nigerian agricultural sector, relevant policies have been formulated and implemented during the post-independence years. The agricultural credit policy, among several others, was aimed at ensuring adequate funds for the agricultural sector. The objective of this paper is to estimate the relationship between formal lending to agriculture and some assumed determinants of agricultural credit lending during the 1978–98 sample period. Lending by financial institutions to the agricultural sector was viewed for the purpose of model development in this study as the "supply of credit" to agriculture. Thus, the sets of determinants of agricultural credit supply to the Nigerian agricultural sector was assumed to consist of economic theory, policy and other variables. The models specified were estimated using the usual least squares procedure. The interest rate variable was negatively related to agricultural credit supply during the 1978–86 sub-period, contrary to expectations. This was explained based on the regime of interest rate regulation prevailing prior to 1987. However, there was a net positive response of agricultural credit lending to the lending rate after interest rate deregulation from 1987, inclusive. The variable for the prescribed minimum lending to agriculture prior to year 1996, related negatively and significantly to lending. That is, credit quota impacted negatively on lending to agriculture during the 1978–95 sub-period. This negative response of credit lending to the prescribed minimum lending to agriculture was sustained even after the abolition of the policy in 1996.

** Dr. Dayo Phillip is of the Department of Agricultural Economics and Farm Management, University of Agriculture, P.M.B. 2240, Abeokuta, Ogun State.

1. Introduction

The Nigerian agricultural sector had traditionally or by mandate been expected to fulfil such roles as providing food for the growing population, generate foreign exchange earnings, employ part of the labour force and provide income for the farming households. The contribution of the agricultural sector to the value of the national output, more commonly known as the Gross Domestic Product (GDP), is still relatively low, averaging less than 40% during the 1980–98 period (CBN, 1998 a). Although the agricultural sector accounts for 60–70% of the non-oil export value, this contribution amounts to less than 10% of the total export per annum recently (CBN, 1998 b). Empirical evaluation of the food supply by the Nigerian agricultural sector is somewhat mixed in terms of results. However, the food import bills, which grew from N58.50 million in 1970, N1,106 million in 1978 to N102,165 million in 1998 (CBN, 1998 b) suggests a growing inability of the agricultural sector to meet the domestic food needs.

Towards the attainment of the goals of the agricultural sector, relevant policies have been formulated and implemented during the post-independence years. The agricultural credit policy, among several others, was aimed at ensuring adequate funds for agricultural production (FMAWRRD, 1988). The objective of increased funding of the agricultural sector, according to the agricultural policy document, was to be pursued through adjustments in the fiscal, monetary and institutional policies.

The need for policies which enhance the flow of credit into the Nigerian agricultural sector is well documented. Farmers need cash backing to hire and/or purchase machineries for farm production as well as post-harvest equipment. Credit needs to be assured for direct production as well as agro-processing and marketing, to ensure that future production decisions are not discouraged (Balogun and Otu, 1991). In apparent support of this view, it was noted that "the shortfall in the supply of fertilizer and the imperfections in its distribution resulted in higher sales prices than approved by government, and this kept fertilizers out of the reach of many farmers (ACGSF, 1995). In subsequent reports, it was further shown that fertilizer prices averaged N1,400 in 1997 against the approved N200 per 50 kg (ACGSF, 1997), and averaged N2,100 per 50 kg in 1998 (ACGSF, 1998), resulting in poor or even no applications of the input by farmers.

Some of the fiscal and monetary policies which government have formulated, mainly through the Central Bank of Nigeria, (CBN), to enhance agricultural credit include prescribed

minimum percentage of credit allocated to agriculture by financial institutions, prescribed percentage of the deposits of rural branches of commercial banks to be retained as rural loans, concessional lending rates to agriculture and the agricultural credit guarantee scheme fund (ACGSF). Institutional arrangements for agricultural credit supply have included the Nigerian Agricultural and Cooperative Bank (NACB), and the Nigerian Agricultural Insurance Company (NAIC).

The objective of this paper is to estimate the relationship between formal lending to agriculture and some assumed determinants of agricultural credit lending during the 1978–98 sample period. The paper is organized into five sections as follows. Section 2 reviews the policy and institutional frameworks and the relevant empirical developments relating to agricultural credit administration in Nigeria from the 1970s to 1998. Section 3 presents the methodology for the pursuit of the study's objective while Section 4 shows the results and discussion. Relevant conclusions and implications of the study are drawn in Section 5.

2. Agricultural Credit Policy and Institutional Framework

This section reviews some of the policies and institutions along with empirical developments in respect of credit supply to the Nigerian agricultural sector since the 1970s. The review is expected to provide a basis for the formulation of the credit supply behavioural models to be investigated later.

2.1 Agricultural Credit Policies and Performance

(a) Share of Agriculture in the Total Loan

Since 1972, commercial and merchant banks were mandated to grant prescribed minimum percentage of their total loans to agriculture. Shortfalls in this regard were expected to be deposited with the NACB for on-lending to agriculture (Usman 2000). The prescribed minimum percentage lending to agriculture rose from 4% in 1970, 10% in 1980, to 15% in 1990 (Balogun and Otu, 1991). This policy was abolished late 1996.

Table 1 shows some relevant information in nominal terms. The commercial banks' nominal lending to agriculture (abbreviated as COMAG) rose steadily from ₦229

million in 1978 to ₦112,550.3 million in 1997 and dropped to ₦107,948.3 million in 1998. The nominal lending by the merchant banks to agriculture (MERAG) rose from ₦28.6 million in 1981 (inception) to ₦23,605.2 million in 1998. The corresponding lending information in real terms is also presented in Table 1. The trend in the combined real lending to agriculture by the merchant and commercial banks appears to have been driven mainly by the volume of lending by the commercial banks. The real total agricultural lending by the commercial banks (RLCOMAG) locally peaked at ₦1,427.6 million in 1982, at ₦2,088.7 million in 1987, at ₦1,515.1 million in 1994 and at ₦3,930.9 million in 1997. However, the real total lending by the merchant banks (RLMERAG) exhibited more of steady increase than any local peaks. Specifically, lending by merchant banks to agriculture increased in real terms from ₦55.6 million in 1981 to ₦749.6 million in 1998, except for the temporary drop from ₦265.6 million in 1994 to ₦199.4 million in 1995.

Table 2 shows the agricultural credit lending by commercial and merchant banks as percentages of their respective total lending to all sectors. Also presented is the total lending to agriculture by commercial and merchant banks as percentage of their combined economy-wide total lending (PLEND). For commercial banks, the percentage lending to agriculture (PCOMAG) rose from 5.6% in 1978 to 27.1% in 1994, and dropped to 10.4% in 1998. The percentage lending to agriculture by merchant banks (PMERAG) rose from 4.0% in 1981 to 14.3% in 1992, dropped steeply to 7.1% in 1993 and rose to 10.3% in 1998. The pre-SAP percentage lending to agriculture by commercial banks averaged 7.8%, but averaged 16.1% since the introduction of SAP, during the 1978–98 period. For the merchant banks, pre-SAP lending to agriculture averaged 4.8%, while agricultural lending averaged 11.3% per annum since the introduction of SAP. When commercial and merchant banks are combined, agricultural lending averaged 7.6% per-SAP, and 14.9% since SAP introduction.

Previous evaluations of the mandatory credit allocations to agriculture have received mixed reviews. According to Babalola and Odoko (1996), mandatory credit allocation is inconsistent with financial sector reform and tends to promote credit misallocation.

Specifically, credit may be used for purposes unintended by creditors. In their own study, Balogun and Otu (1991) noted that "both commercial and merchant banks consistently lent short of the prescribed limits under the credit allocation policy".

(b) Rural Credit Scheme

Under the rural credit scheme introduced in 1977 by the CBN, commercial banks were required to open rural branches. According to Usman (2000), virtually all the rural branches identified as viable were fully established by commercial banks by 1992. As shown in CBN (1998 a), commercial banks performed well above the prescribed minimum rural loan/deposit ratio with the exception of year 1984, which recorded a ratio of N21.00 loan to N100.00 deposit. An all-time high of N98.00 loan to N100.00 deposit ratio achieved in 1995.

(c) Concessional Lending Rates

Prior to the introduction of the Structural Adjustment Programme (SAP) in 1986, agricultural lending rates were largely concessional or subsidized. Specifically, the rates were pegged at 1/2% above the minimum re-discount rates and 2-3% below the prime lending rate. Inflation rates during those years were mostly double digits in magnitudes per annum. Consequently, the real lending rate, which is calculated as the difference between the nominal lending rate and the rate of inflation in each year (Turnovsky, 1977; Meyer, 1980; Sargent, 1979) remained largely negative for most of the years under review. That is, banks' lending to agriculture was disadvantaged in real terms in highly inflationary years, especially early to mid-1980s. It will be noted that although lending rates for agricultural purposes became de-regulated in 1987, the high rates of inflation which accompanied the macro-economic reforms led to high domestic inflation, in excess of 40% in early to mid-1990s (CBN, 1998 a), which further yielded negative real agricultural lending rates. In short, the concessional lending rates to agriculture prior to the introduction of SAP and the prevailing high domestic inflation resulting from SAP produced mixed market signals to creditors during the period under review.

(d) The Agricultural Credit Guarantee Scheme Fund (ACGSF)

Established in 1977 and managed by the CBN, the ACGSF operates through commercial and merchant banks to enhance credit supply to the rural sector. The fund guaranteed, since inception, up to 75% of the amount of loan in default, subject to a maximum of ₦100,000 loan to individuals and ₦1,000,000 loan to corporate or cooperative bodies. Recently, the guarantee limits were increased to ₦500,000 for individual and ₦5,000,000 for corporate or cooperative borrowers (Usman, 2000).

The total agricultural loans guaranteed as percentage of the total loan to agriculture (PGUAR) is shown in Table 2. While agricultural loans as percentage of all loans (PLEND) grew during much of the 1978–98 period, PGUAR stayed mostly below 5% and even steadily declined. Specifically, PGUAR averaged 5% per annum pre-SAP and 1.5% per annum since the introduction of SAP for the available data period. Thus, the allocation of loans to the agricultural sector during the period under review was probably sustained, not by the levels of loan guarantee, but by the existence of credit guidelines.

Table 3 shows that sub-sectoral breakdown of the nominal values of agricultural loans guarantee during the 1978–98 period. The relevant sub-sectors as classified in the various ACGSF annual reports, are livestock (abbreviated as LVSKGUA), food crops (FOOCRGUA), cash crops (CASCRGUA), fishery (FISHGUA), mixed farming (MIXFAGUA) and other enterprises (OTHERGUA). The nominal total guaranteed loan (NGUAR), that is, the sum of the sub-sectoral loan guarantees, are also presented in Table 3.

The most striking structural change relates to the swap in the relative emphasis for the food crops and livestock production. The percentage share of livestock in the total agricultural loans guaranteed rose from 53.5% in 1978 to 70.6% in 1981 and subsequently declined to 10.5% in 1998. The corresponding percentage of the food crop loans guaranteed rose from 25.4% in 1978, peaked at 86.4% in 1993 and slipped slightly to 81.5% in 1998. The difference in the levels of loan guarantees for livestock and food crops have normally been allocated to the other sub-sectors, namely cash crops, mixed farming and other enterprises.

2.2 Specialized Agricultural Credit and Allied Institutions

In addition to the private commercial and merchant banks, government established a few specialized institutions for the promotion of credit availability to agriculture, among other functions. These include the Nigerian Agricultural and Cooperative Bank (NACB) and the Nigerian Agricultural Insurance Company (NAIC).

(a) Nigerian Agricultural and Cooperative Bank (NACB)

The NACB was established in 1972 primarily for direct and on-lending of funds to agriculture. This function distinguished NACB from the commercial and merchant banks which provided credit to agriculture mainly in line with prescribed policy guidelines. Several studies have reviewed the performance of NACB since its inception. The dominant conclusion has been that loan disbursements by NACB has been less than satisfactory. For example, Balogun and Otu (1991) noted that NACB's credit administration was characterized by wide divergence between loan approvals and disbursements. Also, most of the funds allocated by NACB came from the federal government, meaning that the long term survival of this institution had always rested squarely on loan recovery. According to various annual reports of the CBN, especially CBN (1998 b), project funding by NACB was ₦318 million in 1985, peaked at ₦5,104 million in 1994 and declined to ₦2,334 million in 1998. Further analysis of the same reports shows that the NACB loans as percentage of the total loans to the agricultural sector from all sources, was 18.2% in 1985, 24.1% in 1992, 1.9% in 1997 and 1.7% in 1998. On sub-period basis, it is noted that the NACB loans as percentage of the total loans to the agricultural sector averaged 10.4% per annum from 1985 to 1998, but was only 1.4% per annum during the 1995–98 sub-period. This largely suggests a major decline in the agricultural loan disbursement performance of the NACB during the period under review.

(b) Nigerian Agricultural Insurance Company (NAIC)

The Nigerian Agricultural Insurance Scheme (NAIS), under the management of the NAIC, was launched in December 1987. The expected essential linkage between NAIS and agricultural financing was that prospective loan beneficiaries would first obtain insurance cover (Ezeugoh, 1991). This was to encourage lenders to fund

agriculture without fear of loss in the event of some peril, while ensuring that lenders themselves were protected under the ACGSF guidelines. In practice, however, the expected linkage between the ACGSF and NAIS has not been achieved satisfactorily. The poor credit-insurance linkage has been traced to a number of problems. One of the problems relates to rampant loan default among borrowers (farmers). The factors which have contributed to loan default among the Nigerian farmers are diverse but are somewhat classifiable. First are the factors which are beyond the farmers' control, such as drought, diseases and flood (ACGSF, 1980). The second group of factors relate to the lenders. In a series of annual reports by the ACGSF, it has been stated that default in loan repayment can be traced in part to delays in the processing of farmers' loan applications (ACGSF, 1978); infrequent visits to loan beneficiaries (ACGSF, 1980); granting of inadequate loans, enforcement of unrealistic repayment schedules and improper evaluation of funded projects (ACGSF, 1983); and irregular disbursement of approved loans (ACGSF, 1985). The attitudes of farmers have also been cited to constitute the third set of factors in agricultural loan default. These include incidence of loan diversion to non-farm activities or direct consumption, neglect or abandonment of farms for alternative opportunities (ACGSF, 1980); absenteeism, insincerity and poor farm management decisions (ACGSF, 1981; 1982). Loan repayment problems which are traceable in part to Government include inadequate provision of inputs, infrastructure and extension services, as well as inconsistencies in agricultural policies (ACGSF, 1983). Factors which can not really be blamed on any one is particular include poor health or death of farmers and the spread of farmers over a wide area of land, which increases the cost of loan administration and recovery.

Two, commercial banks on their parts, have cited the enforcement of cumbersome procedures for default claims settlement by the CBN as the major factor in the recent low participation in the scheme (Usman, 2000). However, CBN (1989) maintains that the inability to verify some of the default claims by lenders (banks) has largely accounted for the delay in loan default claims settlements.

The crucial point from the foregoing is that the absence of an active linkage between lending to agriculture, agricultural insurance and default claims compensation has

done immense harm to agricultural credit lending in Nigeria. The evidences are not far-fetched. For example, the percentage of the total agricultural loans guaranteed by the ACGSF fell continuously over time during the period under review (Table 2). Furthermore, the participation in the ACGSF, which peaked at 29 banks in 1989, subsequently declined to a low of 5 banks in 1998 (Usman, 2000).

3. Model and Data

Lending by financial institutions to the agricultural sector was viewed for the purpose of model development in this study as the 'supply of credit" to agriculture. The credit supply variable alternatively entered the model in nominal (NLEND) and real (RLEND) values. Variables NLEND and RLEND embodied the combined lending by the commercial, merchant and the Nigerian Agricultural and Cooperative banks. Thus, the sets of determinants of agricultural credit supply to the Nigerian agricultural sector was assumed to consist of economic theory, policy and other variables. The only economic theory determinant of credit supply to agriculture in this study was the lending (interest) rate, which a priori, is assumed to positively influence agricultural credit supply. The lending rate represents the "price" in the credit supply model. The lending rate alternatively entered the model in nominal (NINT) and real (RINT) levels. The year variable, which belonged to the "other" determinants of credit supply was included to detect the trend, if any, over time in the supply of credit to agriculture. If lending increased (decreased) with time during the period under study, the estimate on the coefficient on the year variable was expected to be positively (negatively) signed. The second "other" determinant of agricultural lending is the lending risk variable. This was assumed to negatively influence lending to agriculture. This variable alternatively entered the model in nominal (NRISK) and real (RLRISK) terms.

A number of policy related agricultural credit determinants were tested in this study. One, credit was assumed to be influenced by the prescribed minimum level of lending (PMIN). This was assumed to positively influence credit supply. Two, the value of the agricultural credit guaranteed was assumed to influence credit suppply. A positive relationship was assumed. This variable alternatively entered the model in nominal (NGUAR) and real (RGUAR) terms. Three, a dummy variable was included in the model to capture lending rate deregulation in 1987 (DUM87), as part of the macro-economic structural adjustments

began in 1986. A positive sign was expected on this variable, since under a deregulated lending rate, ceiling are removed, and lenders are encouraged to lend more. Fourth, a second dummy variable was specified to capture the effect of deregulating credit allocation in 1996 (DUM96). Again, a positive influence was assumed by this variable on agricultural lending.

The agricultural credit supply behaviour during the period studied was investigated using linear structural models. The models in their nominal and real terms were estimated in the following forms:

$$\begin{aligned} NLEND(t) = {} & \beta_{01} + \beta_{11}\, DUM87 + \beta_{21}\, DUM96 + \beta_{31}\, NINT(t) + \\ & \beta_{41}\, NRISK(t) + \beta_{51}\, t + \beta_{61}\, PMIN(t) + \beta_{71}\, (DUM87 * NINT(t)) + \\ & \beta_{81}\, (DUM96 * PMIN(t)) + U_1(t) \end{aligned} \quad (1)$$

$$\begin{aligned} NLEND(t) = {} & \beta_{02} + \beta_{12}\, DUM87 + \beta_{22}\, DUM96 + \beta_{32}\, NINT\,(t) + \\ & \beta_{42}\, NGUAR(t) + \beta_{52}\, t + \beta_{62}\, PMIN(t) + \beta_{72}\, (DUM87 * NINT(t)) + \\ & \beta_{82}\, (DUM96 * PMIN(t)) + U_2(t) \end{aligned} \quad (2)$$

$$\begin{aligned} RLEND(t) = {} & \beta_{03} + \beta_{13}\, DUM87 + \beta_{23}\, DUM96 + \beta_{33}\, RINT\,(t) + \\ & \beta_{43}\, RRISK(t) + \beta_{53}\, t + \beta_{63}\, PMIN(t) + \beta_{73}\, (DUM87 * RINT(t)) + \\ & \beta_{83}\, (DUM96 * PMIN(t)) + U_3(t) \end{aligned} \quad (3)$$

$$\begin{aligned} RLEND(t) = {} & \beta_{04} + \beta_{14}\, DUM87 + \beta_{24}\, DUM96 + \beta_{34}\, RINT\,(t) + \\ & \beta_{44}\, RGUAR(t) + \beta_{54}\, t + \beta_{64}\, PMIN(t) + \beta_{74}\, (DUM87 * RINT(t)) + \\ & \beta_{84}\, (DUM96 * PMIN(t)) + U_4(t) \end{aligned} \quad (4)$$

In Equations (1) - (4), the year variable entered synonymously as variable t, where t = 1978, 1979, ..., 1998. Variable DUM87 = 1 if t is 1987 or later, and 0 otherwise. Variable DUM96 = 1 if t is 1996 or later and 0 otherwise. The interaction variables in the model are DUM87*NINT, DUM96*PMIN and DUM87*RINT. The β_{ij}s are the structural parameters in the model, assumed to be unknown and to be estimated and U_{ht}, h = 1, 2, 3, 4 are the structural disturbance terms.

The real values of the variables in Eqs (3) and (4) were obtained by deflating each series by the corresponding composite consumer price index (C-CPI). A few other

supplementary computations were also done to support the regression analysis undertaken. The real lending rate, RINT, in period t was calculated as

$$RINT(t) = NINT(t) \quad INFLARAT(t), \tag{5}$$

where INFLARAT is the real rate of inflation (%) per annum. The nominal risk of leading variable, NRISK, was calculated in period t as

$$NRISK(t) = \frac{[NLEND(t) - NGUAR(t)]^2}{NLEND(t)} \tag{6}$$

The corresponding lending risk in real terms, RRISK, was calculated for each time t as

$$RRISK(t) = \frac{[RLEND(t) - RGUAR(t)]^2}{RLEND(t)} \tag{7}$$

Eqs (6) and (7) are so constructed to ensure that the risk variable is measured in monetary units and that the resulting estimate of lending risk remains non-negative. It will be noted that the lending risk and agricultural credit guarantee variables (nominal or real) are conceptually related. Thus, they were not concurrently entered into any one model, to avoid possible multicollinearity.

Each of Eqs (1) – (4) have additive and interactive components, deliberately so, to derive quantitative policy implications of the various policy regimes built into the credit supply models. To avoid monotony, let us use only Eq (1) to demonstrate the interpretation of the structural parameters, following received econometric procedures (e.g. Johnston, 1984). The estimates of parameters β_{41} and β_{51} are easily interpreted, but not so for the other parameters in the model, due to the presence of additive and interactive terms involving variables DUM87, DUM96, NINT and PMIN.

Let us redefine parameters β_{01} and β_{11} as $\gamma_{01} = \beta_{01}$ for $t < 1987$ and $\gamma_{11} = \beta_{01} + \beta_{11}$ for $t \geq 1987$. Then, it follows that $\beta_{11} = \gamma_{11} - \gamma_{01}$. That is, β_{11} measures the difference in lending between the sample period preceding 1987 and the period from 1987 inclusive. Next, we redefine parameters β_{01} and β_{21} as $\alpha_{01} = \beta_{01}$ for $t < 1996$ and $\alpha_{21} = \beta_{01} + \beta_{21}$ for $t \geq 1996$, implying that $\beta_{21} = \alpha_{21} - \alpha_{01}$. That is, β_{21} in Eq (1) measures the difference in the lending

to agriculture between periods prior to 1996 and the periods from 1996, inclusive. Note the dual role of β_{01} in both interpretations.

Parameter β_{31} measures the change in the lending to agriculture as a result of a unit increase in NINT (nominal lending rate) prior to 1987. A less obvious interpretation is that parameter β_{71} measures the difference in the rate of response of agricultural credit supply to a unit increase in NINT between the periods preceding 1987 and from 1987, inclusive. Parameter β_{61} measures the change in the lending to agriculture as a result of a unit increase in PMIN (prescribed minimum lending to agriculture) prior to 1996. However, parameter β_{81} measures the difference in the rate of response of agricultural credit supply to a unit increase in PMIN between the periods preceding 1996 and from 1996, inclusive. The proof of the latter interpretations readily lies in the reparameterization of the model following the procedures just demonstrated above. Equations (2) – (4) can be similarly interpreted as done for Eq. (1).

The sample period for the study was 1978–98. Data were obtained for the estimation of Eqs (1) - (4) from CBN's (1998a) Statistical Bulletin, various CBN's annual reports and statements of accounts, and various annual reports of the ACGSF. Some other variable series were computed using previously demonstrated procedures.

4. Results and Discussion

The models specified as Eqs (1) – (4) were estimated using the usual least squares procedure. The estimation results along with the relevant statistics are presented as under:

$$\begin{aligned}
&\text{NLEND}(t) = -22158.8 + 188.74\ \text{DUM87} - 34.10\ \text{DUM96} + \\
&\qquad\qquad (-0.56)\text{ns} \quad (1.02)\text{ns} \quad (-0.043)\text{ns} \\
&2.14\ \text{NINT}(t) + 1.00\ \text{NRISK}(t) + 11.25\ t - 9.44\ \text{PMIN}(t) \\
&(0.17)\text{ns} \quad (230.50)^{***} \quad (0.56)\text{ns} \quad (-0.72)\text{ns} \\
&-5.61\ (\text{DUM87}*\text{NINT}(t)) + 12.81\ (\text{DUM96} * \text{PMIN}(t)) \\
&(-0.47)\text{ns} \quad (0.30)\text{ns} \qquad (8) \\
&\text{Adjusted R-square} = 0.999 \quad \text{Model F} = 2,391,065^{***}
\end{aligned}$$

$$\begin{aligned}NLEND(t) = &-8532314.2 - 36219.42\ DUM87 + 177880.45\ DUM96 \\ &(-8.22)^{***} \quad (-4.86)^{***} \quad (12.88)^{***} \\ &-2461.79\ NINT(t) + 1.89\ NGUAR(t) + 4325.32\ t - 1908.62\ PMIN(t) \\ &(-5.55)^{***} \quad (0.05)^{ns} \quad (8.20)^{***} \quad (-2.74)^{***} \\ &+ 2277.35\ (DUM87*NINT(t)) - 9336.34\ (DUM96*PMIN(t)) \\ &(5.09)^{***} \quad (-10.66)^{***} \end{aligned} \tag{9}$$

Adjusted R-square = 0.995 Model F = 538.05***

$$\begin{aligned}RLEND(t) = &-2662.96 + 104.97\ DUM87 + 364.81\ DUM96 + \\ &(-0.15)^{ns} \quad (2.74)^{***} \quad (1.17)^{ns} \\ &1.82\ RINT(t) + 0.99\ RRISK(t) + 1.39\ t - 0.16\ PMIN(t) \\ &(1.14)^{ns} \quad (33.98)^{***} \quad (0.16)^{ns} \quad (-0.014)^{ns} \\ &-3.03\ (DUM87*RINT(t)) - 9.52\ (DUM96*PMIN(t)) \\ &(-2.15)^{**} \quad (-0.49)^{ns} \end{aligned} \tag{10}$$

Adjusted R-square = 0.998 Model F = 1855.78***

$$\begin{aligned}RLEND(t) = &-207228.62 - 48.11\ DUM87 + 5966.92\ DUM96 + \\ &(-1.31)^{ns} \quad (-0.14)^{ns} \quad (2.73)^{***} \\ &7.72\ RINT(t) + 10.08\ RGUAR(t) + 104.77\ t + 40.19\ PMIN(t) + \\ &(0.68)^{ns} \quad (2.12)^{**} \quad (1.31)^{ns} \quad (0.41)^{ns} \\ &1.29\ (DUM87*RINT(t)) - 397.35\ (DUM96*PMIN(t)) \\ &(0.10)^{ns} \quad (-3.15)^{***} \end{aligned} \tag{11}$$

Adjusted R-square = 0.905 Model F = 24.74***

*** statistically significant at the 1% level
** statistically significant at the 5% level
ns not statistically significant at the 10% level

In Eqs (8) - (11), the figures in parentheses are the t-values associated with the respective regression coefficient estimates. The selection of the lead equation for the explanation of the lending to agriculture during the sample period was based on a number of criteria, including the algebraic signs on the estimates of the regression coefficients, the adjusted coefficient of multiple determination, the model F value and the statistical significant of the individual regression coefficient estimates. Some trade offs are involved in the use of these criteria, since only in rare cases does a single model fulfil all of them over and above other competing models.

Taking the just-listed model evaluation criteria into consideration, Eq (9) was selected to serve as the lead model for further discussion of the results. The interest rate variable (NINT) is negatively signed, contrary to expectations. This is not entirely surprising, considering the regime of interest rate regulation prevailing prior to 1987. As noted earlier, the coefficient on NINT measures the response of lending to a unit increase in the lending rate up till 1986. It will be noted, crucially however, that the estimate of the coefficient on interaction variable DUM87*NINT is positive and statistically significant. This suggests that there was a net positive response of lending to a unit increase in the lending rate after interest rate deregulation from 1987, inclusive.

The prescribed minimum lending variable to agriculture, PMIN, prior to year 1996, related negatively and significantly to lending. That is, credit quota impacted negatively on lending to agriculture during the sample period up till year 1995. Stated differently, lenders appeared to have behaved as unwilling lenders, who lent to agriculture strictly based on the prevailing credit guidelines. For example, Balogun and Otu (1991) noted that "the combine shortfall in lending by commercial and merchant banks ranged from 29.5% in 1980 to 44.2% in 1990". The negative and significant estimate of the coefficient on interaction variable DUM96*PMIN suggests that lending to agriculture responded even more negatively to the abolition of the credit quota from the year 1996, based on the available sample period. An attempt to find evidence in the data analyzed shows that the percentage of commercial and merchant bank loans to agriculture was 21.2% in 1994 and 20.2% in 1995, the last two years before the removal of the agricultural credit quota. However, the corresponding figures for 1996, 1997 and 1998 were 17.9%, 9.5% and 10.4%, respectively.

Interestingly, the variable for the value of agricultural loans guaranteed, NGUAR, which caused the lead equation (9) to improve over equation (8), was itself not statistically

significant, although correctly signed. The year variable (t) was positively and significantly related to the lending variable, possibly suggesting that lending to agriculture increased with time, during the sample period.

5. Conclusion and Policy Implications

Credit supply to the agricultural sector in Nigeria increased linearly and significantly with time during the sample period studied. The observed trend was linked in part to the several co-existing guidelines and institutional arrangements, all of which aimed to enhance agricultural credit supply in Nigeria.

An important methodological contribution of this study was the determination of the response of agricultural credit supply to control and deregulation of policy instruments at different temporal regimes. It was shown that lending to agriculture responded negatively to lending rate control prior to 1987 and positively to lending rate deregulation from 1987. As for PMIN, the credit quota policy variable, lending responded negatively and significantly to both imposition and abolition of the policy during the sample period. This result somewhat re-echoes the danger of credit quota imposition. On the part of beneficiaries, there is the possibility of loan diversion to non-farm uses. And, on the lenders' side, they may become unwilling lenders as confirmed by the sharp decline in the banks' voluntary allocation to agriculture from 1996 to 1998. The results obtained indicates that the level of agricultural credit guarantee did not significantly influence lending during the sample period. This is evident in the steady decline in the level of guaranteed loans over time during the period under study. Although the amounts of loans fully repaid per annum was not available to this author, the steady decline in the percentage of total loans guaranteed (PGUAR) and the sharp reduction in banks' loans to agriculture after 1996 suggests some increase in the lending risk over time during the sample period.

Finally, the negative sign on the estimate of the coefficient on interaction variable DUM96*PMIN has been interpreted relative to the available data period. Additional data points after 1996 may well reverse the current algebraic sign on the estimate. For example, with a relatively longer data points following interest rate deregulation in 1987, a significant and positive response of agricultural lending was obtained, on the interaction variable DUM87*NINT.

REFERENCES

ACGSF. 1978. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1980. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1981. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1982. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1983. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1985. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1995. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1997. Agricultural credit guarantee scheme fund, Annual Report.

ACGSF. 1998. Agricultural credit guarantee scheme fund, Annual Report.

Babalola, J. A. and Odoko, F. O. 1996. The performance and future of mandatory allocation of credit to selected sectors in the Nigerian economy, CBN Economic and Financial Review 34(3): 675–690.

Balogun, E. B. and Otu, M. F. 1991. Credit policies and agricultural development in Nigeria, CBN Economic and Financial Review 29(2): 138 155.

CBN 1989. Annual Report and Statements of Accounts.

CBN 1998a. Statistical Bulletin, Vol. 9(2).

CBN 1998b. Annual Report and Statements of Accounts.

Ezeugoh, S. C. 1991. Financing the rural economy: the role of insurance. Paper presented at NAIC's 1991 Management Conferenee, Owerri, Imo State.

FMAWRRD 1988. Agricultural Policy for Nigeria, Federal Ministry of Agriculture, Water Resources and Rural Development, Lagos, 65p.

Johnston, J. 1984. Econometric Methods. Third Edition. New York: McGraw-Hill Book Company.

Meyer, L. H. 1980. Macroeconomics: A Model Building Approach, Cincinnati: South-Western Publishing Co.

Sargent, T. J. 1979. Macroeconomic Theory. New York: Academic Press.

Turnovsky, S. J. 1977. Macroeconomic Analysis and Stabilization Policy. London: Cambridge University Press.

Usman, S. 2000. The Central Bank of Nigeria, Rural Finance Polieies and the Agricultural Credit Guarantee Fund, pp. 56-61 in "After the reforms: which way forward for Central Banks in Rural Finance". AFRACA Rural Finance Series Vol. 1.

TABLE 1

NOMINAL AGRICULTURAL LOANS BY COMMERCIAL AND MERCHANT BANKS (N'M)

YEAR	COMAG	RLCOMAG	MERAG	RLMERAG	TOTAL (Nominal)	TOTAL (Real)
1978	229	663.77	–	—	229	663.77
1979	329.6	856.1	—	—	329.6	856.1
1980	462.2	1090.09	–	—	462.2	1090.09
1981	590.6	1149.03	28.6	55.64	619.2	1204.67
1982	786.6	1427.59	40.1	72.78	826.7	1500.36
1983	940.4	1384.98	54.5	80.27	994.9	1465.24
1984	1052.1	1100.52	79.3	82.95	1131.4	1183.47
1985	1310.2	1310.2	120.2	120.2	1430.4	1430.4
1986	1830.3	1736.53	211.8	200.95	2042.1	1937.48
1987	2427.1	2088.73	327.7	282.01	2754.8	2370.74
1988	3066.7	1692.44	576.5	318.16	3643.2	2010.6
1989	3470.5	1272.64	815.1	298.9	4285.6	1571.54
1990	4221.4	1439.77	1053.6	359.35	5275	1799.11
1991	5012.7	1517.16	1341.8	406.11	6354.5	1923.27
1992	6978.9	1458.8	1596	333.61	8574.9	1792.41
1993	10753	1430.11	2881	383.16	13634	1813.27
1994	17888.8	1515.1	3136	265.61	21024.8	1780.71
1995	25278.7	1238.61	4069	199.37	29347.7	1437.98
1996	33264.1	1260.91	4371.3	165.7	37635.4	1426.61
1997	112550.3	3930.93	21289.8	743.57	133840.1	4674.49
1998	107948.3	3427.8	23605.2	749.56	131553.5	4177.36

Source: Various Annual Reports of CBN and CBN (1998 a)

TABLE 2

PERCENTAGE OF COMMERCIAL AND MERCHANT BANKS' TOTAL LOANS ALLOCATED TO AGRICULTURE AND PERCENTAGE OF ALL AGRICULTURAL LOANS GUARANTEED

YEAR	PMERAG	PCOMAG	PLEND	PGUAR
1978		5.57	5.57	4.93
1979		7.12	7.12	10.19
1980		7.28	7.28	6.7
1981	4.02	6.88	6.66	5.76
1982	3.91	7.64	7.3	3.84
1983	4.6	8.48	8.1	3.65
1984	4.7	9.15	8.58	2.18
1985	6.67	10.77	10.24	3.09
1986	7.64	11.66	11.05	3.35
1987	7.87	13.84	12.7	3.71
1988	13.44	15.68	15.27	3.26
1989	14.38	15.77	15.48	3.02
1990	14.3	16.24	15.81	1.87
1991	13.91	16.01	15.52	1.29
1992	14.26	16.33	15.9	1.03
1993	7.09	16.38	12.83	0.59
1994	9.43	27.05	21.15	0.49
1995	13.29	22	20.17	0.56
1996	10.63	19.63	17.87	0.6
1997	10.51	9.36	9.53	0.18
1998	10.32	10.42	10.4	0.16

Source: Computed from various Annual Reports of CBN and ACGSF

TABLE 3

NOMINAL VALUE OF AGRIC LOANS GUARANTEED UNDER THE ACGSF BY ENTERPRISE GROUPS (N'M)

YEAR	LVSKGUA	FOOCRGUA	CASCRGUA	FISHGUA	MIXFAGUA	OTHERGUA	NGUAR (Total)
1978	6.04	2.8682	1.555	0	0	0.8207	11.2844
1979	21.4425	7.4561	2.22	0	0	2.4781	33.5967
1980	21.0648	5.1763	2.7613	0	0	1.9426	30.945
1981	25.1475	7.4447	2.1611	0	1.1284	0.8891	35.6424
1982	21.8359	5.7064	0.6978	0.0396	0.0777	3.5238	31.7639
1983	21.7897	8.2026	3.9076	1.575	1.9986	2.4076	36.3075
1984	11.8165	3.6064	2.5119	0.826	1.4059	6.7201	24.6549
1985	14.1585	12.498	6.0507	0.7181	3.2514	11.5364	44.2436
1986	25.8044	33.4053	7.6592	1.6447	3.9022	1.5485	68.4174
1987	29.3879	56.9066	13.7903	4.5263	2.102	2.0677	102.1525
1988	18.4804	77.9499	19.8861	4.5368	3.1991	2.2946	118.611
1989	7.8746	100.0131	15.5392	4.5387	0.2277	5.8734	129.3003
1990	4.9672	79.8696	8.9863	3.9007	1	4.6713	98.4944
1991	7.4469	64.9448	8.4602	1.6982	0.054	3.2555	82.1074
1992	6.0561	76.2607	6.4232	1.0387	0.4	3.2131	88.0318
1993	5.5058	70.252	2.3849	0.428	0	2.7031	80.8458
1994	10.5509	81.9724	8.0944	2.438	0	3.7683	103.186
1995	15.0475	121.0676	13.4993	1.512	1	11.5177	164.1621
1996	28.1984	171.8363	15.176	2.145	0	10.2903	225.5025
1997	23.4047	187.4916	13.7555	3.5545	0	13.822	242.0382
1998	22.5871	175.7648	6.0618	3.456	1	6.8275	215.6972

Source: ACGSF (1998)