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SHORT-RUN MACROECONOMIC EFFECTS OF BANK LENDING RATES IN NIGERIA, 1987-91: A COMPUTABLE GENERAL EQUILIBRIUM ANALYSIS

D. OLU AJAKAIYE

OMIC RESEARCH CONSORTIUM

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I remain fully responsible for the ideas and views expressed in this study as well as the enduring weaknesses.

Abstract

In this study, a computable general equilibrium (CGE) model was developed for Nigeria and applied in simulating the short-run macroeconomic effects of the rising bank lending rates experienced during the period of financial liberalization, i.e., 1987-1991, incorporating the confounding effects of the exchange rate depreciation that also occurred during this period. In order to assess the severity of the effects of the rising bank lending rates, the model was simulated while controlling for the exchange rate effects. Analysis of the results shows that the rising bank lending rate along with the exchange rate depreciation had deleterious effects on inflation, output, income, consumer demand and government fiscal posture. It was also found that while the rising bank lending rate without the confounding effects of exchange rate depreciation had deleterious effects on these macroeconomic aggregates, the effects were less severe. Thus, the exchange rate depreciation only aggravated the adverse effects of the bank lending rate during this period.

These findings provide a reasonable basis for suggesting that the monetary authorities should fix the spread between the maximum lending rate and the interest rate on savings deposits at the 3.5% rate that prevailed at the beginning of the financial sector liberalization in 1987. The minimum rediscount rate (MRR) should also be reduced to its 1987 level of 12.8% in order to induce the banks to lower interest rates generally. Moreover, the role of banks in foreign exchange management should be limited to that of intermediation between the Central Bank of Nigeria (CBN) and the end-users. The end-users would then bid directly in the foreign exchange market, a situation that should enhance the potency of appropriate monetary and fiscal policies as instruments for stabilizing the exchange rate of the naira.

I Introduction

The primary function of the financial sector in a typical economy is to mobilize financial resources from the savers and deliver these resources to the borrowers. In other words, the financial sector, like the other sectors in an economy, produces financial services that are used as input by producers in the other sectors of the economy as well as by final consumers, i.e, households, government, investors, exporters and importers of final goods and services. While the impacts on the investors of the delivery of financial services in the form of investment capital can be felt in the medium to long term, impact on other producers of the delivery of financial services, in the form of working capital, are felt in the short run. The short-term nature of the impacts of working capital required as inputs by producers makes the financial sector an integral part of the real sectors of an economy (Callier, 1991).

Basically, the financial sector mobilizes financial resources by offering to pay certain interest rates on various types of savings. Households and businesses may respond to these price incentives by depositing parts of their incomes with the banks. In the specific case of a developing economy, households' response to interest rates on deposits may reflect abstention from current consumption in the Keynesian sense or/and changes in the structure of savings portfolio à la Tobin. In the former case, an increase in savings deposits with the banks may represent an increase in savings rate and/or an increase in income, while in the latter case, the total savings may remain unchanged but a larger proportion of these savings will be deposited with the banks. This latter possibility is referred to as financialization of savings. Either way, deregulation of interest rates on saving deposits in an environment of tight monetary and credit policy, such as the one witnessed in Nigeria since 1987, is expected to result in increases in supply of savings.

So far, at least two studies have been conducted to find out whether, indeed, the supply of savings to the Nigerian banking system has increased since the deregulation of interest rates on savings deposits and the associated increases in these rates. Ndekwu (1989) assessed the impact of changes in interest rates on savings by analysing the structure and growth of bank deposits since the deregulation of interest rates on savings and loans in August 1987. On the basis of his analysis, he concluded that institutionalized savings grew during the deregulation era, thus supporting the view that liberalization of the financial sector will result in increases in supply of savings to the banking system. He pointed out, however, that while high interest rates on savings deposits stimulate the supply of savings to the banking system, the high cost of borrowing in the form of high lending rates may discourage borrowers especially the private sector producers and investors. He noted that although the contributions of interest rates to inflation in Nigeria

was yet to be determined, there is a strong belief that the high cost of borrowing working capital increases cost of production and, hence, prices through a mark-up pricing system. Therefore, he concluded that McKinnon's (1973) claim that financial liberalization facilitates economic development and growth is yet to be conclusively established in the case of Nigeria.

The second study was conducted by Soyibo and Adekanye (1991). They, too, investigated the impacts of deregulation of the financial system on savings mobilization and concluded that there is som evidence of a positive relationship between savings mobilization and financial liberalization in Nigeria. They, however, indicated that further research would be required to relate the link between savings mobilization and investment in Nigeria. As a follow-up, Soyibo (1991) conducted a survey among the Nigerian bankers and found that while deregulation of interest rates enabled banks to mobilize savings, the high cost of funds associated with it adversely affected investment especially in small businesses. This finding suggests that the financial liberalization embarked upon in Nigeria since 1987 might not be facilitating economic growth.

Partly in response to the call by Ndekwu (1989) for investigations into the contributions of interest rate to inflation in Nigeria, Ajakaiye and Omole (1992) carried out an empirical assessment of the contributions of rising bank lending rates to inflation in Nigeria between 1987 and 1990. They found, inter alia, that the bank lending rates during this period contributed significantly to inflation. They concluded that in a developing economy like Nigeria's, the pursuit of high interest rates policy may have significant short-run structural effects in terms of changing the pattern of relative prices, structure of consumption demand, domestic production and, even, the pattern of income distribution. Noting that neither the direction nor the magnitudes of these effects can be specified on *a priori* grounds, they called for considerable empirical research into the macroeconomic impacts of bank lending rates, especially in the short-run. The purpose would be to assess the significance of these impacts and thereby provide a basis for suggesting strategies for implementing a growth-oriented liberal interest rates policy in Nigeria.

In the present study, then, a computable general equilibrium (CGE) model suitable for analyzing and assessing the macroeconomic impacts of changes in bank lending rates has been developed and simulated using the Nigerian data. The report of the study is organized as follows: As a background, the interest rates policy between 1987 and 1991 is reviewed in Part II. This is concluded with a brief review of the trends of major interest rates in Nigeria since 1985 and a statement of the research problem. Part III contains the specifications of the model, while the model simulation results are analysed in Part IV. The conclusions and main policy implications are in Part V.

II Background

Review of interest rates policy, 1987-91

Soon after the commencement of the Structural Adjustment Programme (SAP) in September 1986, Nigeria's monetary authorities discontinued the previous arrangement of fixing various interest rates. Thus, the detailed interest rates structure normally specified in the Central Bank of Nigeria (CBN) Monetary Policy Circulars was abandoned. Beginning in January 1987, the CBN liberalized interest rates by fixing minimum rates on savings and time deposits at 12% and 11% respectively. The maximum lending rate was also increased from 13% to 15% while the MRR was 11%.

In August, 1987, the monetary authorities decided to completely deregulate interest rates by eliminating the minimum interest rates on savings deposits and the maximum lending rates. Furthermore, the MRR was increased from 11% to 15%. The clear indication is that the monetary authorities not only deregulated interest rates but they actually desired upward movements in interest rates.

The decidedly high interest rates policy of 1987 did succeed in mobilizing savings by the banks. However, the associated high bank lending rates attracted loud complaints from various sources. While analysts hinted at the possible adverse effects of high bank lending rates on investment and growth, the manufacturers complained about the impact of high lending rates on cost of production and, hence, on prices. The Manufacturers Association of Nigeria (MAN) and some analysts mounted considerable pressure on government during 1987, and by December 1987, the CBN reduced the MRR from 15% to 12.75%. However, the banks remained free to set their interest rates on deposits and loans.

The interest rates policy enunciated in December 1987 was retained throughout 1988. It turned out that despite the reduction in MRR, bank lending rates continued to increase. This situation elicited further complaints from producers. The monetary authorities also expressed concern over the wide spread between banks' deposit rates and their lending rates. Stating that this practice is unfair to depositors and borrowers, the CBN merely enjoined them (the banks) to make efforts to narrow the gap.

Deregulation of interest rates continued in 1989. Thus, the banks remained free to set their rates on deposits and loans while the CBN continued to enjoin banks to voluntarily narrow the gap between their deposit and lending rates. During 1989, government embarked on ultra-restrictive monetary policies. Correspondingly, the MRR was raised from 12.75% to 13.25% by March 1989. In November that year, the MRR was further raised to 18.5% thus tacitly resuming the high interest rates policy.

Meanwhile, the spread between savings deposit and lending rates continued to widen despite the moral suasion by the CBN against such trend. Consequently, in November 1989, the CBN took steps to stem the tide of the widening spread between deposit and lending rates by specifying the maximum spread of bank interest rates as follows:

- The spread between savings deposit rate and prime lending rate shall be kept at a maximum of 7.5 percentage points.
- The margin between the prime and the highest lending rates shall be a maximum of 4 percentage points.
- The inter-bank interest rate shall be at least one percentage point below the prime lending rate.

This interest rates policy was retained throughout 1990. In response to the increase in MRR during 1989, the banks decided to increase their interest rates on deposits to comply with the spread stipulated. Therefore, the basically high interest rate policy continued to be maintained.

By the beginning of 1991, government had become more concerned about rising bank lending rates but it was not willing to jeopardize the apparently favourable response to high interest rates on deposits. It was also clear that the policy of controlling the spread between deposit and lending rates embarked upon in November 1990 was insufficient to secure the much desired reductions in the bank lending rates. Thus, in 1991, government decided to fix the minimum lending rate at 21% - but without setting a minimum interest rate on deposits. In essence, the banks remained free to determine their interest rates on deposits but the lending rate could not exceed 21%. To complement this policy, the MRR was reduced from 18.5% to 15.5%.

Profile of interest rates, 1987-91

Evidence suggests that between 1987 and 1990, government pursued a basically high interest rates policy. Available data reveal that during this period the banks increased interest rates on deposits and studies have shown that this may have enabled them to mobilize savings (Ndekwu, 1989; Soyibo and Adekanye, 1991).

However, as can be seen from Table 1, the banks have also increased their interest rates on loans. Moreover, Figure 1 shows that the spread between maximum bank lending rate and savings deposit rate kept increasing such that by 1990, the gap had almost tripled what it was in 1987. Compared to what it was in 1986, the spread had increased approximately five-fold by 1990 as can be seen in Table 1.

Figure 1 Spread between maximum lending rate and savings deposit rate, 1986-1991

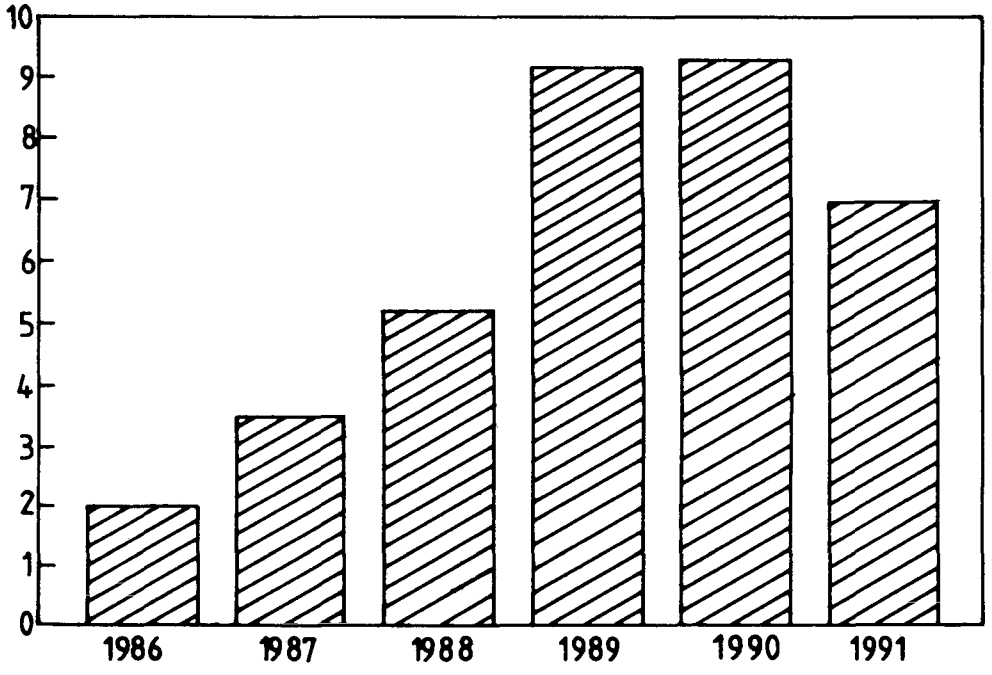

Table 1 Trends of key interest rates in Nigeria, 1986-1991

Interest rates	1986	1987	1988	1989	1990	1991
Savings deposits	9.5	12.2	12.1	16.5	18.0	13.8
Min. rediscount	10.0	12.8	12.8	18.5	18.5	15.5
Prime lending	9.6	14.0	16.6	25.5	25.3	20.0
Max. lending	11.5	15.7	17.3	25.7	27.3	20.7
Spread	2.0	3.5	5.2	9.2	9.3	6.9

Source: Central Bank of Nigeria, Lagos.

Note: Spread is the difference between the interest rate on savings deposits and the maximum bank lending rate.

Throughout 1991, the producers kept insisting that the 21% maximum lending rate was still too high. The argument was that the benefits of this maximum lending rate had been swamped by the continuous depreciation of the naira exchange rate. Consequently, they were expecting a further reduction in the maximum bank lending rate in 1992. In the meantime, the bankers kept complaining about the loss associated with a sudden peg of the maximum lending rate a level lower, in some cases, than the interest rate on time deposits contracted during 1990. The bankers mounted greater pressure arguing that sustenance of the policy in 1992 may spell doom for the entire banking industry - especially since the prudential guidelines also came into effect in 1991. The bankers prevailed, and the maximum lending rate ceiling was removed in 1992. As expected, the producers have been mounting pressure for its restoration.

The problem

It is clear that the complaints and pressures against the high bank lending rates are coming mainly from the producers. These complaints and pressures relate more to the implications of high lending rates on cost of working capital and, hence, on prices of their goods and services, i.e., the short-run effects.

Essentially, the complaints stem from the fact that the producers rely on the commercial banks for the working capital to procure intermediate inputs locally and abroad. Their demands for working capital increase with the depreciation of the exchange rate. Increases in bank lending rate under such circumstances further compound the problem of rising costs of working capital thereby increasing the significance of the cost of funds in the total cost of production. Evidence from a special industrial survey conducted in 1990 suggests that this has really been the case in Nigeria (FRN, 1990). Analysis of the survey data revealed, for example, that in 1985 interest on loans accounted for over 20% of the total cost of production in only 15% of the establishments covered. By 1989, this cost item accounted for over 20% of the total cost of production in 55% of these establishments. The indication is that the number of firms facing high and rising cost of working capital had increased by almost 400% between 1985 and 1989.

There is no doubt that the producers' arguments are logical and evidence suggests that they are credible. Even the Nigerian monetary authorities have come to recognize the cost-push inflationary effects of rising bank lending rates (CBN, 1992). Nevertheless, it is also true that several other policies implemented since 1986 are likely to have worked in the same way. Prominent among these policies are:

- the upward reviews in wages in 1988 and 1991;
- the privatization and commercialization of public enterprises and the associated increases in user charges (1988);
- pursuit of cost recovery pricing policy by the producers of certain basic economic

and social infrastructures, e.g., water, health, energy, etc. (1988);
- reduction of subsidies on agricultural inputs (1987);
- increases in prices of petroleum products, especially lubricants, gasoline and fuel oils several times between 1986 and 1991; and
- the escalating budget deficit due to unplanned government expenditure and the associated increases in government borrowing from the banking system.

At the same time, there are several other policies, programmes and developments that might have assisted in ameliorating the adverse macroeconomic effects of the rising bank lending rates and other cost escalating policies. Prominent among these are:

- the generally favourable weather conditions since 1986, especially the absence of severe droughts, and the associated increase in agricultural production and food supply;
- the establishment of agencies such as the Directorate of Food, Roads and Rural Infrastructure (DFRRI) and the associated improvement in rural living and road conditions leading to improved production of food and supply to the urban areas;
- the implementation of the so-called reflationary package of 1988;
- the establishment of the National Directorate of Employment (NDE) most of whose programmes are intended to generate employment and, hence, income; and
- the implementation of the so-called SAP relief package soon after the 1989 SAP riots.

All of these policies, programmes and developments may have assisted in preventing a precipitous fall in real consumer demand despite the unprecedented increases in prices in Nigeria.

Under these circumstances, therefore, it would be misleading to attribute all of the macroeconomic impacts of the rising cost and, hence, prices to the rising bank lending rates. It would be equally misleading, and probably dangerous, to ignore the complaints by the analysts, producers, top government functionaries and, lately, the CBN about the adverse effects of the rising bank lending rates on key macroeconomic aggregates simply because the actual data on these aggregates do not portray a very desperate situation despite the serious inflationary pressure.

In order to avoid either of these two pitfalls, it is necessary to systematically analyse the short-run macroeconomic impacts of bank lending rates in a country like Nigeria where production is heavily dependant on imported inputs and the exchange rate has been depreciating precipitously. These impacts should be compared with those likely if production in Nigeria were independent of imported intermediate inputs; in which case, the tendency for the working capital base to be increased as the exchange rate depreciated and the direct implications for cost of working capital would have been avoided.
Such a counterfactual analysis should assist in sorting out the significance or otherwise

of the confounding influence of exchange rate depreciation on the macroeconomic impacts of the rising bank lending rates during this period. The simulation results should provide a reasonable basis for assessing the severity of these impacts and drawing certain policy implications. This is especially important in view of the results of the earlier studies mentioned above which indicated that the pursuit of liberal interest rates policy has been efficacious in mobilizing savings but may have adverse short-run inflationary effects in Nigeria (Ajakaiye and Omole, 1992) and in developing counties in general (Taylor, 1992; Ndulu, 1987; Pegatienan, 1987). The model is presented in the next section.

III The model

The nature of the problems discussed above and features of the Nigerian economy has informed the structure of the model. For the present purposes, therefore, the model is decomposed into the following five blocks, an equilibrium condition and model closure rule.

- Price block
- Demand block
- Production block
- Income determination block
- Government fiscal operations block
- Savings-investment identity (equilibrium condition)
- Resource constraints and model closure rule

The main features of each block are discussed while the equations of the model are presented in Table 2.

Price Block

Prices in this model are set so as to cover the cost of production. In other words, prices are determined primarily by costs and are based on nested Leontief and Cobb-Douglas cost functions. Production costs are made up of value-added costs, viz, costs of labour and capital and costs of locally produced and imported intermediate inputs as well as the net indirect taxes. Costs of intermediate input are determined by the technology while the value added costs are derived from the familiar Cobb-Douglas cost function. Net indirect taxes are determined by policy and, hence, assumed to be fixed proportions of the prime costs. Against this background, Equation 1 is the usual specification of the value-added cost per unit of output for a profit maximizing firm with the usual Cobb-Douglas production function. Equation 2 defines the purchasers' price as the sum of the primary input cost, depreciation allowances, net indirect taxes, locally produced intermediate inputs and imported intermediate inputs.

Table 2 Model equations

1. Price determination

$$p_i^v = v_i r_i^{1-\alpha_i} w_i^{\alpha_i} \quad i = 1,\ldots,30 \tag{1}$$

$$P_i = P_i^v + d_i + t_i - s_i + \sum_j^{30} P_j a_{ji} Z_{ji} + h_i \quad i = 1,\ldots,30 \tag{2}$$

$$Z_{jk} = L^r[\lambda_j + e(1-\lambda_j)] \quad k = \textit{financial sector} \quad \textit{and} \quad j = 1,\ldots,30 \tag{3}$$

$$\lambda_j = \frac{\sum_j^{30} a_{ji}}{\sum_j^{30} a_{ji} + h_j} \quad i = 1,\ldots,30 \tag{4}$$

2. Demand

$$c_i = \frac{r_i}{p_i} \quad i = 1,\ldots,30 \tag{5}$$

$$g_i = \bar{g}_i \quad i = 1,\ldots,30 \tag{6}$$

$$n_i = \bar{n}_i \quad i = 1,\ldots,30 \tag{7}$$

$$x_i = \bar{x}_i \qquad i = 1,\ldots,30 \tag{8}$$

$$m_i = \bar{m}_i \qquad i = 1,\ldots,30 \tag{9}$$

3. Input-output

$$q_i = \sum_{j}^{30} a_{ij}\, q_j + c_i + g_i + n_i + x_i + m_i \qquad i = 1,\ldots,30 \tag{10}$$

4. Income determination

$$L_i^D = A_i^L v_i q_i \left(\frac{r_i}{w_i}\right)^{1-\alpha} i \tag{11}$$

$$K_i^D = A_i^k v_i q_i \left(\frac{w_i}{r_i}\right)^{\alpha} \qquad i = 1,\ldots,30 \tag{12}$$

$$Y = \sum_{i}^{30} \bar{w}_i L_i^D + \sum_{i}^{30} \bar{r}_i K_i^D \tag{13}$$

$$Y^D = (1 - t_y) Y \tag{14}$$

$$PSAV = S_y Y^D \tag{15}$$

$$E = Y^D - PSAV \tag{16}$$

5. Government fiscal operations

$$GREV = \sum_{i}^{30} t_j \, p_i q_i + t_y Y \tag{17}$$

$$GEXP = \sum_{i}^{30} P\bar{g}_i + w_g L_g + \sum_{i}^{30} s_i \, p_i \, q_i \tag{18}$$

$$GSAV = GREV - GEXP \tag{19}$$

6. Savings - investment identity

$$TSAV = PSAV + GSAV + \sum_{i}^{30} \bar{m}_i + \sum_{i}^{30} h_i q_i - \sum_{i}^{30} \bar{x}_i \tag{20}$$

$$IT = \sum_{i}^{30} p_i \bar{n}_i \tag{21}$$

$$IT = TSAV \tag{22}$$

7. Resource constraints and model closure rule

$$L_i^D < L_i^s \quad i = 1,\ldots,30 \tag{23}$$

$$k_i^D < k_i^s \quad i = 1,\ldots,30 \tag{24}$$

$$w_i = \bar{w}_i \quad i = 1,\ldots,30 \tag{25}$$

$$r_i = \bar{r}_i \quad i = 1,\ldots,30 \tag{26}$$

Definition of Variables

P^v_i = value added price of sector *i*
V_i = value - added per unit of output of sector *i*
r_i = rental price of capital of sector *i*
W_i = wage rate of sector *i*
α_i = share of wages in total value added of sector *i*
p_i = producer price of sector *i*
d_i = per unit indirect tax of sector *i*
t_i = per unit depreciation of sector *i*
s_i = per unit subsidy of sector *i*
a_{ij} = per unit intermediate input requirement of sector *j* from *i*
z_{ij} = cost escalation sector of per unit intermediate input requirement of sector *j* from *i*
h_i = per unit imported intermediate input requirement of sector *i*
L^r = bank lending rate
λ_j = share of locally produced intermediate input in total intermediate input requirement
e = exchange rate
c_i = private consumption demand of sector *i*
p_i = share of private consumption demand of sector *i* in total private consumption demand
E = total nominal private consumption expenditure
g_i = government consumption expenditure of sector *i*
n_i = investment demand of sector *i*

x_i = export demand of sector *i*
m_i = final goods imports of sector *i*
q_i = gross output of sector *i*
L^D_i = demand for labour of sector *i*
A^L_i = constraint for labour demand function of sector *i*
K^d_i = demand for capital of sector *i*
A^k_i = constraint of capital demand function of sector *i*
Y = total nominal income
Y^D = total nominal disposable income
t_y = income tax rate
$PSAV$ = total nominal private savings
S_y = private savings rate
$GREV$ = nominal total government expenditure
$GEXP$ = total nominal government expenditure
W_g = government wage rate
L_g = labour demand by government
$GSAV$ = government savings
$TSAV$ = total savings
IT = total nominal investment
L^s = labour stock
K^s = capital stock
w_i = fixed nominal wage rate
r_i = fixed nominal rental price of capital

In order to capture the effects of the bank lending rate on the cost of working capital along with the confounding influence of exchange rate movements on these effects, the intermediate input requirements of all sectors from the financial sector, i.e., working capital, has to be decomposed into two parts. One is the part used to procure local intermediates and the other is the part used to procure imported intermediates. This is necessary because while the lending rate applies to both components, the exchange rate magnifies only the working capital needed to finance imported intermediate inputs. In this connection, it is noted that the total intermediate input requirement in each sector is a linear combination of the locally produced and imported intermediate inputs; this has been used to split the sectoral working capital requirements into the two components using Equations 3 and 4. Equation 3 shows that it is only the imported intermediate input component that will be magnified by the exchange rate, while the lending rate applies to both components. The result of these manipulations (Z_{jk}) has been introduced into the intermediate input components of Equation 2. This captures the effects of the lending rate on the cost of working capital along with the magnifying effects of exchange rate on the component of working capital needed to finance imported intermediate inputs. This way, the confounding influence of exchange rate movements on the effects of bank lending rate on the cost of working capital will be better captured.

Demand

For the present purposes, the Cobb-Douglas utility function is imposed on the private consumer such that the sectoral consumption demand for a utility maximizing consumer is as specified in Equation 5. All other components of final demand are fixed in real terms as specified in Equations 6 to 9. Accordingly, real sectoral government consumption expenditure, investment, exports and imports remain fixed. Real government consumption expenditure has been fixed because the sectoral distribution of this component of final demand is hardly influenced by the structure of relative prices. Real investment is fixed because of the basic concern with the short-run responses. Sectoral exports and imports are fixed in real terms primarily because available data show that the proportion of non-oil exports that would have been expected to be quite responsive to the movements in the exchange rate remains far below 10% of the total export earnings. Also, data on analysis of imports by end use reveal that imports of consumer goods continued to increase despite the massive exchange rate depreciation. These facts indicate that the various elasticities of substitution between production for domestic use and exports as well as between imports of final goods and their local substitutes are most likely to be quite negligible.

Domestic production

In this model, production is demand determined. Therefore, domestic production is the sum of demand for intermediate input, private consumption demand, government consumption demand, investment demand, export demand and demand for imported final goods. See Equation 10. This characterization of the condition of domestic production is quite reasonable in the present Nigerian situation where there is pervasive excess capacity and severe unemployment. Therefore, the supply of labour can be reasonably assumed to be infinitely elastic at the going wage while capacity utilization will increase at the going rate of return so long as excess capacity exists.

Income determination

As usual, income is the sum of payments to labour and capital used in the process of production. The demand for labour and capital by a cost minimizing firm are as specific in Equations 11 and 12, while Equation 13 defines the total nominal income as usual. Disposable income is defined in Equation 14, while Equation 15 defines the nominal savings. Total nominal consumption expenditure is residually determined as shown in Equation 16. The rationale for endogenizing savings rate is a reflection of the nature of the equilibrium condition and the closure rule, which are discussed in later sections.

Government fiscal operations

Government revenue is made up of indirect taxes and income tax, which are related to output and income respectively. Correspondingly, government revenue is as specific in Equation 17. Therefore, government revenue profile will be directly affected by the level of production and income in the economy.

Government expenditure is the sum of the nominal value of government consumption expenditure, government wage bill and subsidy as shown in Equation 18. Nominal values of sectoral government consumption expenditure will change with changes in sectoral prices only, while the government wage bill will change with changes in the labour demand by government. Subsidy will change with changes in sectoral prices and sectoral output. Government savings is the difference between government revenue and expenditure as defined in Equation 19.

Savings-investment identity

In this model, equilibrium is attained when total nominal domestic savings is equal to the nominal value of the fixed investment. Equation 20 defines total nominal savings, while Equation 21 defines the total nominal value of investment. Equation 22 says that total nominal savings must equal total nominal value of investment.

It has been mentioned that private consumption expenditure is residually determined (Equation 16). This implies that the private savings rate is endogenously determined. Since real investment is fixed and its nominal value will change with changes in sectoral prices, private savings must change as necessary to satisfy Equation 22. This explains the endogeneity of private savings rate mentioned earlier. It should also be noted that the change in private savings necessary to satisfy Equation 22 will be affected by the changes in government savings, which is itself affected by changes in the sectoral prices, the level of sectoral output, income and government demand for labour, as can be inferred from Equations 17 and 18.

Resource constraint and closure rule

CGE models are generally overdetermined and the ways in which these models are rendered mathematically determined are referred to as the closure rules. There is a general agreement that the choice of a closure rule is greatly influenced by the nature of the problem at hand (Rattso, 1982; Decaluwe and Martens, 1988) and the objective condition of the economy under consideration. The choice of a closure rule generally revolves around the binding primary resource constraints and the view of the analysts about the functioning of the relevant economy during the period under consideration.

In the present context, the problem at hand focuses more on the impact of rising bank lending rate on the cost of working capital in an economy whose production structures depend on imported intermediate input. Moreover, the economy is faced with considerable unemployment and there is excess capacity in all sectors of the economy. In Nigeria, the labour market is so highly organized that wage setting does not bear a perceptible relationship with the value of marginal product of the various categories of labour. The oligopolistic market structure that prevails in all activity sectors either by design (as the producers' associations remotely control economic decisions and behaviours of members) or by default (as each activity sector is dominated by a few firms) makes it difficult for the profit rates to reflect the scarcity values of capital.

Against this background, it is assumed that there is excess supply of labour and capital as specified in Equations 23 and 24 respectively. Correspondingly, the model is closed assuming that production factors are not necessarily paid according to the values of their marginal products and that savings adjusts to the fixed investment. See Decaluwe and

Martens, 1988, for further elaborations of this and other closure rules, especially the implications for model results and interpretations. Thus, nominal per unit wages and profits are assumed to be fixed as specified in Equations 25 and 26, respectively.

IV Analysis of model simulation results

Data and base run

The data base for CGE models is the Social Accounting Matrix (SAM). The SAM is an accounting record for the whole economy and the way it is drawn up is determined primarily by the nature and purpose of the model being built. For the present purposes, where attention is focussed on the overall macroeconomic impacts of bank lending rate in Nigeria, the SAM for 1985 presented in Appendix I is quite adequate. A look at Appendix IIa to IId will reveal that, as required, the base run of the model replicated the data base and so can be used for simulation purposes. Accordingly, the model has been applied in simulating the short-run macroeconomic impacts of the bank lending rates in Nigeria for the period between 1987 and 1991. The simulation results are presented next.

Impacts of bank lending rates in Nigeria

A feature of the Nigerian economy that must be incorporated into an analysis of the macroeconomic impact of bank lending rates is the direct and indirect dependence of the activity sectors on imported intermediate inputs. For instance, a quick look at Appendix I will show that two thirds of the activity sectors depend directly on imported intermediate inputs. With the exception of the Producers of Government Services sector, therefore, all other sectors depend indirectly on imported intermediate inputs.

This feature of the Nigerian economy is at the root of the complaints by the producers who argued that the beneficial effects of the lending rate policy of 1991 were seriously eroded by the exchange rate depreciation that occurred during the year. The need to incorporate this structural feature of the economy influenced the model specifications, especially, the price block. The model has thus been simulated to incorporate the confounding influence of the exchange rate profile during the period. The relevant bank lending rate and exchange rate profiles are as follows:

Year	Lending Rate (%)	Exchange Rate (N/$)
1986	11.5	1.27
1987	15.7	3.60
1988	17.3	4.51
1989	25.7	7.39
1990	27.3	8.04
1991	20.7	9.91

The simulated macroeconomic effects of the bank lending rate and exchange rate profiles displayed above are presented in Table 3.

Table 3 Macroeconomic impacts of lending and exchange rates, 1987-91 (Percentage changes)

Macro aggregate	1987	1988	1989	1990	1991
Lending rate	36.52	10.19	48.55	6.23	-24.18
Exchange rate depre.	-64.66	-20.18	-38.98	-8.12	-18.89
Price index	12.80	1.26	11.14	3.28	-7.28
Disposable income	-12.20	-1.98	-11.31	-3.61	8.75
Real consumption	-12.80	-3.05	-16.21	-5.61	13.22
Real savings	11.83	3.26	11.21	3.31	-5.40
Real govt revenue	-12.16	-1.96	-11.17	-3.55	8.58
Real govt expenditure	-0.87	0.62	-0.04	0.05	1.04
Fiscal balance	11.06	4.37	15.19	3.85	-6.36
Gross output	-12.28	-2.37	-11.58	-3.77	9.23
Value added	-12.26	-2.12	-11.75	-3.77	9.11
Wage	-12.09	-2.32	-11.73	-3.80	9.04
Operating surplus	-12.25	-1.88	-11.19	-3.55	8.69

Source: Model simulation results

Price level

One of the major criticisms of the rising lending rate profile in Nigeria has been its adverse effects on costs and, hence, prices. The model simulation results provide estimates of these effects as well as the influence of the exchange rate. As can be seen

from Table 3, the 36.5% increase in bank lending rate coupled with the 64.7% depreciation in exchange rate between 1986 and 1987 caused the general price index to increase by almost 13% during the period. For the present purposes, the price index is the weighted sum of sectoral prices, the weights being the shares of the various sectors in the total GDP. It should be observed that, as a result of the 24% decrease in the bank lending rate in 1991, inflation rate declined by over 7% despite the fact that the exchange rate depreciated by almost 19% during the year.

Private income, consumption and savings

As a result of the increases in prices and associated reduction in output (to be discussed later), real private disposable income fell by 12.2% in 1987. However, real private consumption expenditure fell by 12.8% during the year, while total real savings increased by 11.8%. Notice the general tendency for real consumption expenditure to fall more precipitously than income while real savings tend to increase throughout the simulation period. This is an artifact of the Kaldorian closure and the associated forced savings effects. Specifically, recall that consumption expenditure is residually determined with the consequence that consumption bears the full brunt of the increases in sectoral and general price levels. This can have deleterious impact of the welfare of the people, especially, if spending on food is reduced.

Government fiscal posture

Table 3 shows that real government revenue declined more than government expenditure. This is a reflection of the fact that real sectoral government consumption expenditure is fixed so that only real government wage bill and subsidies may change with changes in prices and output. On the other hand, real government revenue from direct tax depends on income, which has been shown to have declined. Moreover, real indirect taxes depend on the level of output, which, as will be shown momentarily, also fell. Consequently, real government budget deficit increased, implying that government fiscal posture worsened. Government fiscal posture improved somewhat in 1991 following the reduction in bank lending rate during that year.

Output and value added

The impacts of the bank lending rate profile along with the confounding effects of exchange rate depreciation on output and value added as well as on the two main components, namely, wages and profits, are shown in Table 3. From the table, it can be

seen that aggregate gross output declined between 1987 and 1990. Notice that aggregate gross output increased by over 9% in 1991 for reasons already mentioned as well.

Turning to the impacts on aggregate value added, it is clear that real value added declined annually until 1990; it moved upward in 1991 because of the lower bank lending rate.

Attention should be drawn to the fact that while both wage and profit incomes declined between 1987 and 1990, wage income declined more. However, in 1991 when the lending rate fell, wage income increased more than profit income. The resulting pattern of functional income distribution is as follows:

Year	Wage share	Profit share	Total
1987	22.91	77.09	100
1988	22.83	77.17	100
1989	22.72	77.28	100
1990	22.68	77.32	100
1991	22.73	77.28	100

Evidently, the rising bank lending rate depreciating exchange rate tended to redistribute income slightly against wage income earners, although, the reduction in bank lending rate in 1991 abated this tendency somewhat. Observers of the Nigerian situation will find that this development may have influenced the continuous demand for wage increases since 1988, to which government and other employers had to respond favourably often after considerable labour unrests.

The result overall was worsened inflationary pressure in the Nigerian economy, alleviated somewhat by the lower bank lending rate of 1991. Real disposable income and real consumption expenditure declined while forced savings increased, Government fiscal posture worsened while gross output and real value added both declined annually until 1991 when the lower bank lending rate caused slight increases.

Impacts of bank lending rate profile alone: A counterfactual

In a nutshell, evidence suggests that the rising bank lending rate profile of the 1987-90 period really escalated production costs and prices in the Nigerian economy. This situation contributed to the weak effective demand. Government fiscal posture deteriorated just as the gross output and value added also declined. Moreover, there was a slight tendency for income to be redistributed in favour of profit earners.

It turned out that these adverse effects were somewhat abated in 1991 when government attempted to lower the bank lending rate. This notwithstanding, producers

continued to complain that the confounding effects of exchange rate depreciation seriously eroded the benefits of the lower lending rate. In order to assess the veracity of this complaint, the model has been simulated *without* the confounding influence of exchange rate depreciation. A comparative analysis of these results with those presented above is carried out next.

Table 4 shows the macroeconomic impacts of the bank lending rate profile of 1987-91 *without* the confounding effects of the exchange rate depreciation that occurred during the period. Beginning with the inflationary effects, it is clear that even without the confounding effects of exchange rate depreciation, the rising bank lending rate would have put considerable pressure on inflation in Nigeria. However, compared with the situation presented in the preceding section, the inflationary effects would have been considerably less severe as can be seen from Figure 2.

With regard to the income and consumption effects, Figures 3 and 4 are quite illuminating. Again, the impacts are less profound when compared with those of the preceding scenario, as can be seen in Figures 3 and 4. The indication, therefore, is that the welfare effects of the bank lending rate profile of 1987-91 would have been less pronounced if the exchange rate had been relatively stable.

Turning to the impacts on government fiscal posture, it is clear that government revenue would still have declined more than government expenditure, with the result that government budget deficit would have continued to grow. However, as shown in Figure 5, the growth of government budget deficit would have been much lower had it been possible to avoid the confounding effects of exchange rate depreciation.

Table 4 Macroeconomic impacts of lending rates alone, 1987-1991 (Percentage changes)

Macro aggregate	1987	1988	1989	1990	1991
Lending rate	36.52	10.19	48.55	6.23	-24.18
Price index	3.60	0.79	5.08	1.49	-4.67
Disposable income	-2.76	-1.52	-5.10	-1.60	4.82
Real consumption	-4.37	-1.25	-6.32	-2.06	6.08
Real savings	2.36	-2.81	0.96	0.53	-0.86
Real govt revenue	-3.68	-1.50	-4.93	-1.57	4.66
Real govt expenditure	-1.46	-2.25	-2.86	-0.45	2.41
Fiscal balance	2.18	-3.34	0.23	1.12	-0.67
Gross output	-3.98	-0.39	-5.34	-1.71	5.37
Value added	-4.89	-1.47	-5.28	-1.64	4.99
Wage	-3.02	-1.20	-5.03	-1.60	4.85
Operating surplus	-0.70	-1.62	-5.17	-1.61	4.86

Source: Model simulation results

Figure 2: Inflationary effects of lending rate in Nigeria, 1987-1991

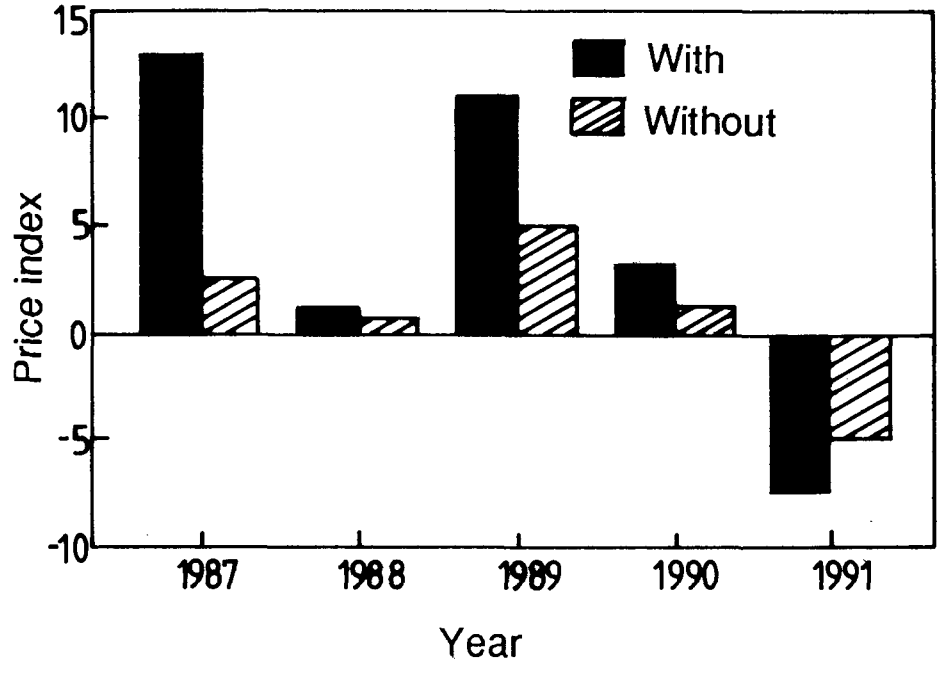

Figure 3: Income effects of lending rate in Nigeria, 1987-1991

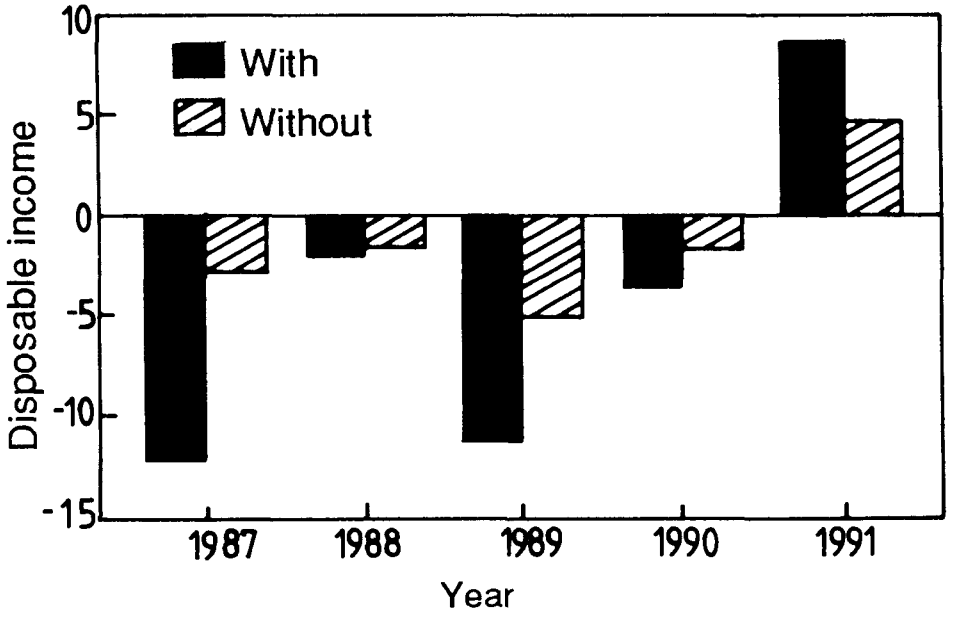

Figure 4: Consumption effects of lending rate in Nigeria, 1987-1991

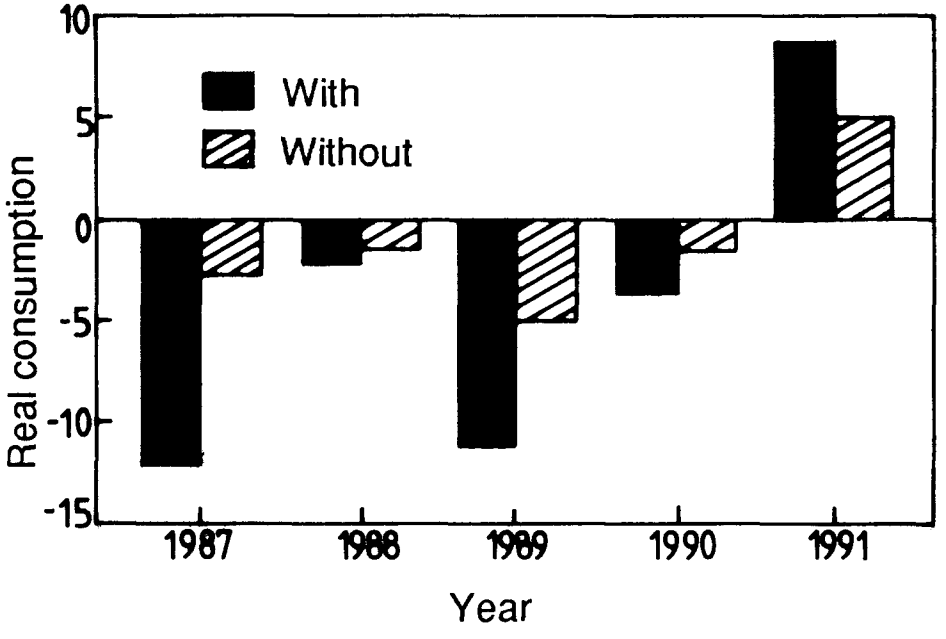

Figure 5: Fiscal effects of lending rate in Nigeria, 1987-1991

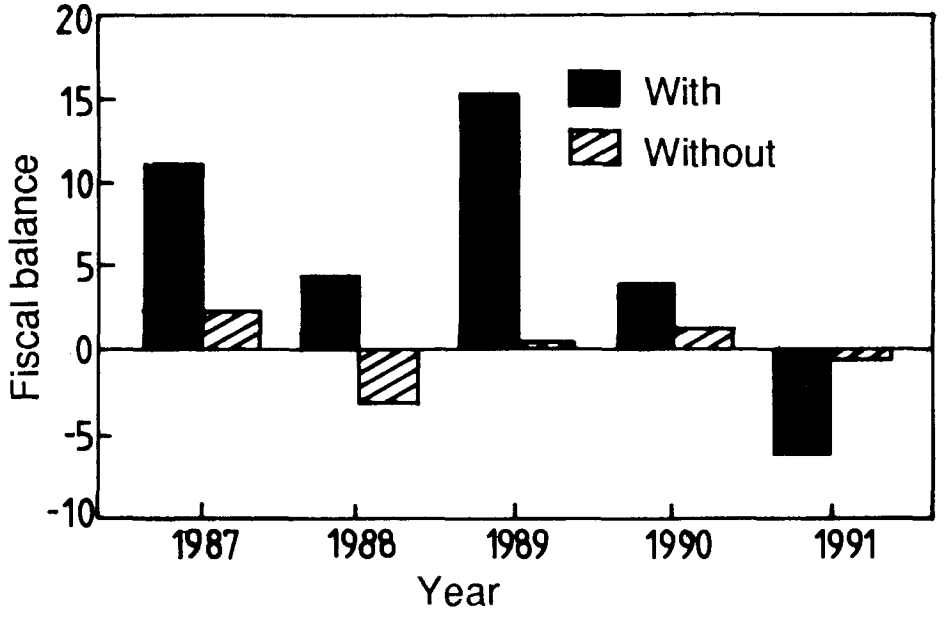

Figure 6: Gross output effects of lending rate in NIgeria, 1987-1991

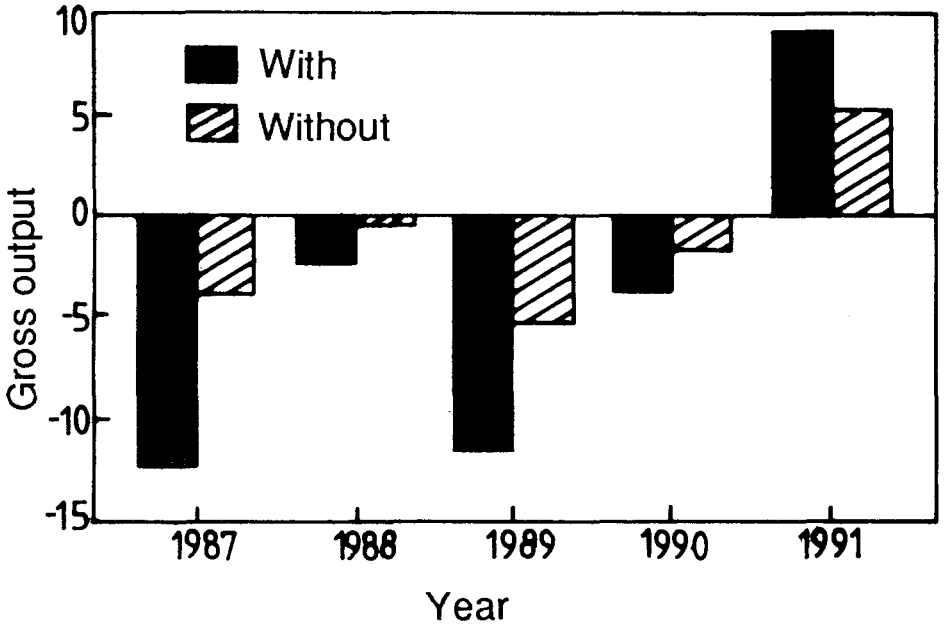

Figure 7: Value added effects of lending rate in Nigeria, 1987-1991

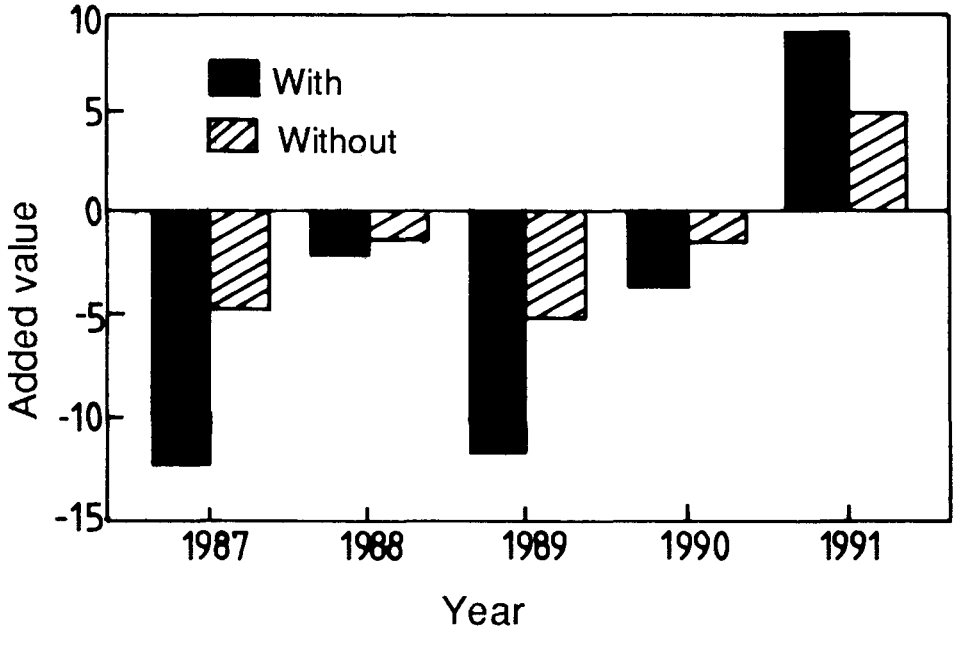

Table 5 Effects of bank lending rates on income distribution with and without influence of exchange rate 1987-1991

	1987		1988		1989		1990		1991	
	With	Without	With	Without	With	Without	With	Without	With	Without
Wage Share of Income	22.91	22.82	22.83	22.9	22.72	22.92	22.68	22.93	22.73	22.92
Profit Share of Income	77.09	77.18	77.17	77.1	77.28	77.08	77.32	77.07	77.27	77.08

Source: Model Simulation Results

Table 6 Macroeconomic effects of 1991 lending rate with and without exchange rate influence

Macro aggregate	With	Without
Price index	-7.28	-4.67
Disposable income	8.75	4.82
Real consumption	13.22	6.08
Real savings	-5.40	-0.86
Real govt revenue	8.58	4.66
Real govt expenditure	1.04	2.41
Fiscal balance	6.36	-0.67
Gross output	9.23	5.37
Value added	9.11	4.99
Wage	9.04	4.85
Operating surplus	8.69	4.86

Source: Extracted from the last columns of Tables 3 and 4.

Figure 6 shows the impacts of the bank lending rate profile of 1987-91 on gross output with and without the confounding effects of exchange rate profile of this period. The picture in respect of value added is shown in Figure 7. Clearly, the confounding effects of exchange rate depreciation on the impacts of the rising bank lending rate on gross output and value added are quite substantial. Table 5, showing the impact of the bank lending rate profile on income distribution with and without the confounding effects of exchange rate depreciation, indicates that the tendency to redistribute income against wage earners is due more to the confounding effects of exchange rate depreciation. Specifically, the results show that the rising bank lending rate, acting alone, could have redistributed income in favour of wage earners as shown in Table 4, whereas the reverse is the case in Table 3.

Focusing on the extent to which the exchange rate depreciation of 1991 eroded the desirable effects of the 1991 bank lending rate, additional insights can be gained by comparing the last columns of Tables 6 and 7. For ease of reference, these are shown in Table 6. From the table, it is clear that the 19% depreciation of the exchange rate really eroded the beneficial effects of the lower lending rate of 1991.

For example, whereas the inflationary pressure would have reduced by 4.67% without the confounding effects of exchange rate depreciation, the reduction in inflationary pressure when this confounding effect is incorporated is 7.28%, i.e., almost double what could have occurred. The same is true in respect of real disposable income, real consumption expenditure, government fiscal posture, output and value added. These results indicate, therefore, that there is merit in the argument that the almost 19% exchange rate depreciation of 1991 actually eroded the potential benefits of the lower

lending rate of that year. By far the greatest erosion of benefits is in respect of real forced savings, government fiscal posture and real consumption expenditure.

V Conclusions and main policy implications

Conclusions

This study attempted to assess the short-run macroeconomic impacts of the rising bank lending rate profile of the period between 1987, when the monetary authorities started liberalizing the financial sector, and 1991. The justification for the study is the observed instability in the interest rates policy as the authorities seem to be responding to the demands of the most vigorous and/or influential complainants. If this situation continues, there will be considerable uncertainty, which may jeopardize appropriate responses by the relevant economic agents. Consequently, the much desired smooth and orderly development of the national economy in which the private sector will be predominant may be jeopardized.

In order to assist in preventing this situation, a computable general equilibrium model useful in simulating the short-run macroeconomic impacts of bank lending rates has been developed. The model was specified so as to capture the confounding influence of exchange rate movements on the impacts of bank lending rate in order to reflect the import dependent feature of the existing production structures in Nigeria.

The model has been simulated to quantitatively assess the macroeconomic impacts of the bank lending rate profile of the period between 1987 and 1991 along with the confounding influence of the exchange rate profile of the same period. Analysis of the results provides a basis for concluding that liberalizing interest rates under the basically high interest rates policy of the 1987-1990 period when the exchange rate depreciated actually had considerable adverse effects on the economy in the short run. Specifically, it contributed to the escalating production costs and hence, prices in the economy, further weakening effective demand while contributing to the worsening government fiscal posture. The associated decline in output and value added aggravated the unemployment problem.

In order to assess the veracity of the argument that the exchange rate depreciation witnessed during the period seriously compounded the problem, a counterfactual was constructed by simulating the model assuming a stable exchange rate during the period. Analysis of the results leads to the conclusion that the bank lending rate profile, acting alone, would have had considerable adverse inflationary effects. Effective demand would have been weakened just as output would have fallen thereby exacerbating the unemployment problems. Therefore, the exchange rate profile of the period only aggravated the adverse effects of the rising bank lending rate over the period.

It is only in respect of the functional income distribution consequences of the bank lending rate profile that the incorporation of the exchange rate effects reversed the outcomes. Without the confounding influence of exchange rate depreciation, the bank lending rate profile would have redistributed income in favour of wage income earners and this may have reduced the importance of inequity as an argument for wage reviews.

With regard to the issue of the degree to which the beneficial effects of the lower bank lending rate of 1991 were eroded by the exchange rate depreciation of that year, evidence indicates that this may have been an issue. The exchange rate depreciation considerably eroded the potential beneficial effect of the 1991 bank lending rate policy as its contributions to inflationary pressure, the fall in real income and consumption expenditure, the worsening budget deficit, falling output and the associated rising level of unemployment may not have been more than 50% of what they were in most cases.

Main policy implications

The findings and conclusions of this study indicate that liberalizing interest rates without paying attention to the movements in bank lending rates may be counter productive, at least, in the short run. Thus, while banks may be in a better position to mobilize savings as a result of the liberalized interest rates under a basically high interest rates policy, the associated increases in lending rates will not only discourage productive investments but will also create a hostile economic environment for the existing producers. The challenge, therefore, is to design a liberal interest rates policy that will minimize the adverse effects on the macroeconomic environment in the short run.

This study also indicates that the adverse effects of high bank lending rates on the macroeconomic environment in the short run tend to be exacerbated if the exchange rate is also depreciating and production structures are dependent on imported intermediate inputs. Since the import dependent production structures cannot be altered in the short-run, the challenge is to design a complementary exchange rate management strategy that will minimize the confounding effects of exchange rate depreciation on the short-run macroeconomic consequences of high bank lending rates.

In order to deal with the first challenge, it is necessary to take a deeper look at the sources of savings deposits in Nigeria. It is quite likely that depositors may be responding to element of the liberalization policies other than interest rates on saving deposits. Indeed, the suspicion is that it is the very rich and their corporate bodies who make the huge bank deposits, especially with the numerous merchant banks. Since this class of savers is also expected to be investors, it is reasonable to suspect that their increased savings has more to do with other aspects of the liberalization polices, especially the foreign exchange policy. A careful study of the characteristics of the saving and investing public in Nigeria will be necessary to further clarify the situation.

Meanwhile, it seems more important to focus on the implications of the liberal

interest rates policy for bank lending rates rather than the interest rates on savings deposits, since it is clear that high lending rates since 1987 have contributed to the hostile macroeconomic environment for the producers, the consumers and even the government. The current situation, whereby, the spread between the interest rate on savings deposits and the maximum bank lending rate keeps widening, despite the unprecedented increase in number of banks in Nigeria from 40 in 1985 to 120 by 1992 indicates that there is no significant price competition among the banks. This is especially so since there is no reason to expect that the Nigerian banking industry is a cost increasing one. Observers of the Nigerian situation will, however, realize that the Nigerian banking industry is essentially oligopolistic and the widening spread is a reflection of oligopoly rent. Therefore, in order to ameliorate the adverse macroeconomic effects of the high bank lending rates, the monetary authorities should impose a ceiling on the spread between the interest rate on savings deposit and the maximum bank lending rate. It is suggested that the spread should not exceed 3.5%, which was prevailing in 1987 when the liberalization policy began. In order to encourage the banks to reduce interest rates generally, the monetary authorities should reduce the MRR from the present 18.5% to 12.8% which was also prevailing in 1987.

Regarding the design of complementary exchange rate and overall development policies, it is important to recognize that continued reliance on the Inter-bank Foreign Exchange Market (IFEM) as it is currently operating will make it impossible to effectively stabilize the exchange rate, let alone get it to appreciate. Given the heavy dependence on imported intermediate inputs by the producers, the IFEM should be reorganized in ways that will reduce the role of banks from allocation to intermediation. The existing situation in which banks are engaged in allocation of foreign exchange has led to the emergence of the so-called foreign exchange banks to the detriment of the fundamental role of banks, namely, to mobilize savings and deliver same to investors. If the end-users are explicitly involved in the exchange rate determination processes, the emerging exchange rate may better reflect the fundamentals of the Nigerian economy. Appropriate monetary and fiscal policies necessary to stabilize the exchange rate in the short run can then be taken. In the long run, the structure of domestic production should change so as to minimize dependence on imported inputs. In order to promote smooth and orderly changes in the structure of production, an appropriate tariff policy should be put in place. Specifically, any protection granted must be dated and reviewed periodically with a view to its eventual removal. In this connection, necessary incentives should be put in place to encourage the establishment of local capacity to produce certain critical intermediate inputs that are currently imported into Nigeria. The ultimate aim of development policy should be to residualize non-competitive imports, without which the efficacy of the usual trade and exchange rate policies in shifting expenditures appropriately will remain in doubt.

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Appendices

Appendix I A social accounting matrix for Nigeria, 1985

Activity sectors	1	2	3	4	5	6	7	8	9	10
Agriculture	3185.56	0.00	0.00	0.00	0.00	0.00	476.99	191.89	215.61	0.00
Livestock	0.00	0.00	0.00	0.00	0.00	0.00	148.07	0.00	0.00	37.43
Fishing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forestry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crude Petroleum	0.00	0.00	211.81	0.00	58.91	1.71	0.00	0.00	0.00	0.00
Other Mining	0.00	0.00	0.00	0.00	0.33	1.47	0.00	0.00	0.00	0.00
Food	0.00	378.98	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drink Bev & Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Textiles	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	133.41	0.00
Footwear & Leather	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.31
Wood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper	0.00	0.00	0.10	0.00	3.83	0.00	0.00	20.28	0.00	0.00
Drugs & Chem	21.16	0.00	1.43	0.00	1.10	26.26	0.00	6.76	0.00	0.00
Refineries	50.81	0.00	6.10	0.55	1.37	41.22	19.74	24.24	18.81	5.31
Rubber & Plastics	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	42.85
Iron and Steel	0.00	0.00	0.00	0.00	7.70	7.12	0.00	0.00	0.00	0.00
Fabricated Metal	346.78	0.00	0.04	0.45	1.79	10.58	0.00	0.00	0.00	0.00
Vehicle Assembly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Manuf.	206.92	0.00	0.00	0.00	0.00	0.00	0.00	2.48	0.00	0.00
Utilities	0.00	0.00	21.35	0.00	2.48	3.02	19.30	21.17	67.90	8.71
Bldg & Constructn	0.00	0.00	0.00	0.00	4.65	5.06	0.00	0.00	0.00	0.00
Transport	0.00	0.00	4.60	1.50	195.10	88.85	158.84	106.67	24.55	15.52
Communications	0.00	0.00	2.08	0.00	1.05	0.00	5.47	4.92	4.65	0.70

Appendix 1.....contd

Distributive Trade	95.84	64.12	9.05	0.05	14.26	0.23	297.38	145.97	71.99	37.71
Hotel and Restrnts	0.00	0.00	0.00	0.00	2.98	0.00	0.00	0.00	0.00	0.00
Fin. & Insurance	0.00	0.00	47.62	0.45	8.74	1.57	13.46	12.02	8.65	1.68
Real Estate&Bus Serv	0.00	0.00	53.69	0.00	31.28	27.03	4.40	2.68	2.07	0.22
Housing (Dwelling)	0.00	0.00	4.48	0.00	1.76	0.00	3.63	3.60	2.46	1.65
Comty Soc&Pers Serv	0.00	0.00	1.37	0.55	0	14.82	0.00	0.00	0.00	0.00
Prod of Govt Serv	0.00	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00
dom. int. input	3907.07	443.1	365.13	3.55	338.32	228.94	1147.29	542.67	550.12	163.09
import	84.93	0.00	0.00	0.00	301.48	0.00	106.93	23.94	36.01	12.91
tot. int. input	3992.00	443.10	365.13	3.55	639.80	228.94	1254.22	566.61	586.12	176.00
wages	2512.00	76.00	288.00	12.00	196.20	17.06	275.69	238.57	354.68	78.49
operating surplus	16472.00	4738.62	391.33	1329.26	11577.82	398.98	608.16	145.52	430.16	212.31
capital cons exp.	745.00	27.00	31.00	3.00	366.08	12.56	76.91	125.97	95.70	23.08
household income	19729	4841.62	710.33	1344.26	12110.1	428.6	960.76	510.06	880.54	313.88
govt revenue	0.00	0.00	4.00	74.00	25.68	0.00	88.24	456.47	141.75	38.98
subsidies	67.00	0.00	0.00	61.00	0.00	0.00	0.00	0.00	0.00	0.00
domestic savings	0	0	0	0	0	0	0	0	0	0
sundry govt exp.	0	0	0	0	0	0	0	0	0	0
Total	23654.00	5284.72	1079.46	1360.81	12775.58	657.54	2303.22	1533.14	1608.41	528.86

Appendix 1.....contd

11	12	13	14	15	16	17	18	19	20
0.00	0.00	175.96	0.00	0.12	33.11	0.00	0.00	182.75	0.00
0.00	0.00	39.10	0.00	1.09	0.00	0.00	0.00	28.38	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00
71.32	131.46	17.71	0.00	77.70	1.43	0.01	5.64	17.49	0.00
0.00	0.00	0.00	574.17	0.00	0.00	0.00	0.00	16.94	138.50
0.00	0.00	0.00	0.00	0.00	147.97	0.00	0.00	33.71	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.16	0.00
0.00	0.00	7.85	0.00	0.00	0.00	0.00	0.00	36.64	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.00	28.28	0.00
0.00	0.00	0.00	0.00	9.95	1.15	0.00	75.00	0.00	0.00
4.61	0.00	0.00	0.00	1.09	2.69	25.17	50.00	20.31	0.00
0.00	16.85	11.31	0.00	7.64	31.79	22.61	80.00	11.47	0.00
0.00	0.00	173.14	11.06	0.05	15.17	22.77	248.79	11.29	0.04
9.61	11.19	10.42	0.57	9.38	129.68	15.72	75.00	26.71	0.23
0.00	0.00	0.00	0.00	53.32	10.08	1.54	0.00	0.00	0.00
0.00	0.00	9.04	0.00	1.81	285.11	130.28	120.00	22.44	0.00
0.00	0.00	0.00	0.00	0.00	0.00	42.56	0.00	5.32	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.67	0.00	0.00	5.94	1.24	0.00	7.38	1.59
4.36	7.60	12.80	21.08	9.79	81.68	6.81	4.15	1.41	2.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	6.45
21.68	50.04	50.74	123.44	39.24	208.06	36.78	210.73	10.24	9.16
0.60	1.64	2.73	1.37	1.76	6.83	1.64	6.81	0.25	0.57
46.66	85.17	109.49	43.26	54.12	43.57	12.61	289.59	29.29	5.44
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
1.44	2.88	7.26	5.12	12.02	76.53	6.75	26.37	2.28	5.75
0.24	0.44	2.19	0.44	1.31	2.19	0.94	4.37	0.37	53.56
1.01	2.99	4.69	1.49	1.78	5.68	1.85	2.41	1.27	1.18
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.54	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00

Appendix 1.....contd

161.54	310.27	636.09	781.99	282.17	1088.68	330.53	1198.86	529.71	224.97
9.88	29.62	54.98	10.84	145.66	268.79	36.71	159.24	13.25	0.95
171.42	339.89	691.07	792.83	427.83	1357.47	367.24	1358.10	542.96	225.92
60.32	184.79	143.07	63.96	124.12	165.08	162.76	117.16	239.10	283.74
58.23	234.88	765.02	54.34	236.81	0.00	329.46	924.78	423.54	51.89
19.48	41.73	42.90	41.17	29.28	123.06	39.99	39.89	111.22	183.47
138.03	461.4	950.00	159.47	390.21	288.14	532.21	1081.83	773.86	519.1
12.52	42.17	89.30	97.57	32.48	45.83	51.86	22.68	61.43	0.00
0.00	0.00	0.00	0.00	0.00	1003.19	0.00	0.00	0.00	0.00
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
321.97	843.46	1731.36	1049.87	850.52	688.24	951.31	2462.61	1378.25	745.02

Appendix 1.....contd

21	22	23	24	25	26	27	28	29	30
0.00	0.00	0.00	0.00	151.91	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	53.07	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	58.75	0.00	0.00	0.00	0.00	0.00
37.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.18	1261.27	2.32	191.61	0.00	11.49	0.00	0.00	0.00	0.00
234.79	14.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.26	0.10	0.00	30.77	4.21	1.56	0.00	2.00	0.00
0.00	0.15	0.00	0.00	18.64	2.06	1.62	0.00	0.00	0.00
0.00	0.31	0.88	28.49	0.00	1.01	1.84	0.00	1.16	0.00
0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14.14	1.28	0.00	21.33	0.00	1.01	0.00	0.00	0.00	0.00
1.17	8.10	9.12	26.15	3.08	138.37	6.52	0.00	7.22	0.00
18.75	0.15	0.10	35.50	0.00	0.00	4.55	0.00	4.73	0.00
1.28	139.99	0.45	0.00	0.00	2.78	0.00	0.00	0.00	0.00
0.00	102.08	0.00	27.40	0.00	0.00	1.39	0.00	2.37	0.00
29.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.02	7.18	8.00	126.32	13.96	17.72	4.19	0.00	6.33	0.00
0.00	23.18	1.20	0.00	0.00	0.00	0.00	33.87	0.00	0.00
53.33	94.49	36.67	2229.35	14.17	84.47	18.85	0.00	18.05	0.00
2.72	8.36	4.57	33.10	7.34	20.13	7.80	0.00	11.73	0.00
170.29	430.41	3.26	153.30	119.15	67.32	19.34	0.00	10.72	0.00
0.00	9.73	13.35	0.00	0.00	0.52	0	0.00	0.00	0.00
12.24	74.04	9.43	0.00	4.43	49.40	21.55	0.00	26.47	0.00
3.56	122.22	88.55	2.03	13.38	53.62	10.49	0.00	8.67	0.00
8.57	4.94	6.28	187.64	8.41	48.57	10.40	0.00	12.73	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	2302.59	184.47	3062.22	497.06	502.69	110.10	33.87	112.18	0.00

Appendix 1.....contd

823.00	115.42	2.34	0.00	0.00	0.49	0.00	0.00	0.00	0.00
1423.00	2418.01	186.81	3062.22	497.06	503.18	110.10	33.87	112.18	0.00
507.00	1148.22	209.29	2544.70	196.56	697.78	106.64	0	54.28	0
1021.00	1568.16	40.47	6194.24	260.22	1210.83	1373.76	1998.00	521.23	0.00
4.00	896.72	41.54	447.71	17.42	789.09	15.16	0.00	17.09	0.00
1532	3613.1	291.3	9186.65	474.2	2697.7	1495.56	1988	592.6	0
1.00	42.80	0.00	0.00	2.90	0.00	0	0.00	0.00	0.00
0.00	206.20	3.00	0.00	0.00	0.00	7.15	0.00	0.00	0.00
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2956.00	5867.71	475.111	2248.87	974.16	3200.88	1598.51	2031.87	704.78	4835.50

Appendix 1.....contd

INT DEM	HH EXP	GEXP	INV	EXPORT	IMPORT	TOTAL
4613.90	18170.12	23.54	0	1056.13	209.69	23654.00
307.15	4902.79	6.67	0	73.25	5.14	5284.72
59.34	1020.12	0	0	0	0.00	1079.46
359.82	939.15	0.98	0	60.86	0.00	1360.81
2473.91	875.62	17.65	33.7	9510.75	136.04	12775.59
432.61	244.64	0	0	16.45	36.16	657.54
431.41	1478.50	29.27	239.30	231.55	106.80	2303.23
66.97	1162.56	22.59	184.72	178.74	82.44	1533.14
197.64	499.16	82.95	836.28	31.11	38.73	1608.41
97.51	85.63	31.46	317.15	11.80	14.69	528.86
141.62	657.09	11.35	476.54	16.67	28.22	321.97
406.22	185.99	90.16	185.39	0.82	25.12	843.46
602.79	870.89	52.53	229.47	3.83	28.15	1731.36
601.17	366.97	16.66	72.78	1.22	8.93	1049.87
241.07	405.05	47.01	212.12	1.81	56.53	850.52
612.55	0.00	115.08	108.85	1.77	150.00	688.24
414.98	526.53	13.35	87.99	15.09	106.83	951.31
0.00	2410.79	69.74	420.10	72.05	510.08	2462.61
227.21	1135.63	8.83	5.7	0.88	0.00	1378.25
479.84	130.32	134.86	0	0	0.00	745.02
74.41	0.00	210.85	2670.74	0	0.00	2956.00
3905.12	1211.68	755.8	0	276.71	281.61	5867.71
138.82	273.72	62.57	0	0	0.00	475.11
2429.60	9764.44	54.83	0	0	0.00	12248.87
26.78	942.18	5.2	0	0	0.00	974.16
438.15	2772.19	3.63	0	9.76	22.85	3200.88
489.93	2113.59	577.1	0	379	1961.11	1598.51
329.48	1640.60	61.79	0	0	0.00	2031.87
39.28	655.50	0	0	0	0.00	704.78
0.00	82.36	4835.5	0	133.19	215.55	4835.50
20639.27	55533.80	7342.15	5127.75	12083.43	4024.63	96701.77
2237.37					2237.37	4474.74
22876.64	55533.80	7342.15	5127.75	12083.43	6262.00	96701.77
11057.26	0		0	0	0	0
53571.02	0		0	0	0	0
4377.22	0		0	0	0	0
69005.5	0	4835.5	0	0	0	0
1331.66	7384.1		0	0	0	8715.76
-1347.54	0	1347.54	0	0	0	0
0	10923.1	-5795.34	0	0	0	5127.75
0	0	985.91	0	0	0	985.91
96701.76	73841	8715.76	5127.75	12083.43	6262.00	202731.7

Source: Constructed using 1985 input - output table and other national accounts aggregate obtained from Federal Office of Statistics, Lagos.

Appendix IIA Actual and base run macroeconomic aggregates

Macro aggregate	Actual	Base Run	% Change
Price index	1.00	1.00	0.000
Real income	73841.00	73841.10	0.000
Disposable income	66456.90	66456.99	0.000
Real consumption	55533.80	55533.91	0.000
Real savings	10923.10	10923.09	0.000
Real govt revenue	8715.76	8715.77	0.000
Real govt expenditure	14511.10	14511.11	0.000
Fiscal balance	-5795.34	-5795.34	0.000
Gross output	96701.76	96682.87	-0.020
Wage	15892.76	15892.78	0.000
Operating surplus	53571.02	53571.09	0.000
GDP at market prices	73825.11	73825.20	0.000

Source: Table 3 and model simulation results

Appendix IIB Actual and base run sectoral consumption

Sectors	Actual	Base Run	% Change
Agriculture	18170.12	18170.15	0.000
Livestock	4902.79	4902.81	0.000
Fishing	1020.12	1020.11	-0.001
Forestry	939.15	939.15	0.000
Crude Petroleum	875.62	875.61	-0.001
Other Mining	244.64	244.64	0.000
Food	1478.5	1478.48	-0.001
Drink Bev & Tobacco	1162.56	1162.58	0.002
Textiles	499.16	499.15	-0.002
Footwear & Leather	85.63	85.63	0.000
Wood	657.09	657.05	-0.006
Paper	185.99	185.99	0.000
Drugs & Chem	870.89	870.89	0.000
Refineries	366.97	366.99	0.006
Rubber & Plastics	405.05	405.05	0.000
Iron and Steel	0	0	0.000
Fabricated Metal	526.53	526.55	0.004
Vehicle Assembly	2410.79	2410.80	0.001
Other Manuf.	1135.63	1135.62	-0.001
Utilities	130.32	130.33	0.008
Bldg & Constructn	0	0	0.000
Transport	1211.68	1211.66	-0.002
Communications	273.72	273.73	0.004
Distributive Trade	9764.44	9764.46	0.000
Hotel and Restrnts	942.18	942.18	0.000
Fin. & Insurance	2772.19	2772.18	0.000
Real Estate & Bus Serv	2113.59	2113.58	0.000
Housing (Dwelling)	1640.6	1640.61	0.001
Comty Soc. & Pers Serv	665.5	665.50	0.000
Prod of Govt Serv	82.36	82.36	0.000

Source: Model Simulation Results

Appendix IIC Actual and base run sectoral gross output

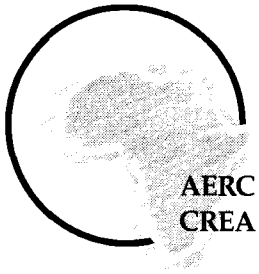
Sectors	Actual	Base Run	% Change
Agriculture	23654.00	23654.03	0.000
Livestock	5284.72	5284.73	0.000
Fishing	1079.46	1079.45	-0.001
Forestry	1360.81	1360.81	0.000
Crude Petroleum	12775.59	12775.59	0.000
Other Mining	657.54	657.54	0.001
Food	2303.23	2303.21	-0.001
Drink Bev & Tobacco	1533.14	1533.15	0.001
Textiles	1608.41	1608.40	-0.001
Footwear & Leather	528.86	528.86	0.000
Wood	321.97	321.90	-0.022
Paper	843.46	843.45	-0.001
Drugs & Chem	1731.36	1731.37	0.001
Refineries	1049.87	1049.89	0.001
Rubber & Plastics	850.52	850.52	0.000
Iron and Steel	688.24	688.25	0.001
Fabricated Metal	951.31	951.33	0.002
Vehicle Assembly	2462.61	2462.61	0.000
Other Manuf.	1378.25	1378.25	0.000
Utilities	745.02	745.02	0.000
Bldg & Construction	2596	2596.00	0.000
Transport	5867.71	5867.71	0.000
Communications	475.11	475.12	0.002
Distributive Trade	12248.87	12248.89	0.000
Hotel and Restaurants	974.16	974.16	0.000
Fin. & Insurance	3200.88	3200.88	0.000
Real Estate & Bus Serv	1598.51	1598.51	0.000
Housing (Dwelling)	2031.87	2031.87	0.000
Comty Soc. & Pers Serv	704.78	704.78	0.000
Prod of Govt Serv	4835.5	4835.50	0.000

Source: Model simulation results

Appendix IID Actual and base run sectoral value added

Sectors	Actual	Base Run	% Change
Agriculture	19662	19662.03	0.000
Livestock	4841.62	4841.63	0.000
Fishing	714.33	714.33	0.000
Forestry	1357.26	1357.26	0.000
Crude Petroleum	12135.78	12135.79	0.000
Other Mining	428.6	428.60	0.000
Food	1049	1049.00	0.000
Drink Bev & Tobacco	966.53	966.53	0.000
Textiles	1022.29	1022.29	0.000
Footwear & Leather	352.86	352.86	0.000
Wood	150.55	150.55	0.001
Paper	503.57	503.57	0.000
Drugs & Chem	1040.29	1040.29	0.000
Refineries	257.04	257.04	0.000
Rubber & Plastics	422.69	422.69	0.000
Iron and Steel	-669.22	-669.24	0.003
Fabricated Metal	584.07	584.07	0.000
Vehicle Assembly	1104.51	1104.51	0.000
Other Manuf.	835.29	835.29	0.000
Utilities	519.1	519.1	0.000
Bldg & Constructn	1533	1533.00	0.000
Transport	3449.7	3449.7	0.000
Communications	288.3	288.30	0.000
Distributive Trade	9186.65	9186.66	0.000
Hotel and Restrnts	477.1	477.10	0.000
Fin. & Insurance	2697.7	2697.71	0.000
Real Estate & Bus Serv	1488.41	1488.41	0.000
Housing (Dwelling)	1998	1998.00	0.000
Comty Soc. & Pers Serv	592.6	592.60	0.000
Prod of Govt Serv	4835.5	4835.50	0.000

Source: Model simulation results



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