EXCHANGE RATE DEPRECIATION AND THE STRUCTURE OF SECTORAL PRICES IN NIGERIA UNDER AN ALTERNATIVE PRICING REGIME, 1986-89

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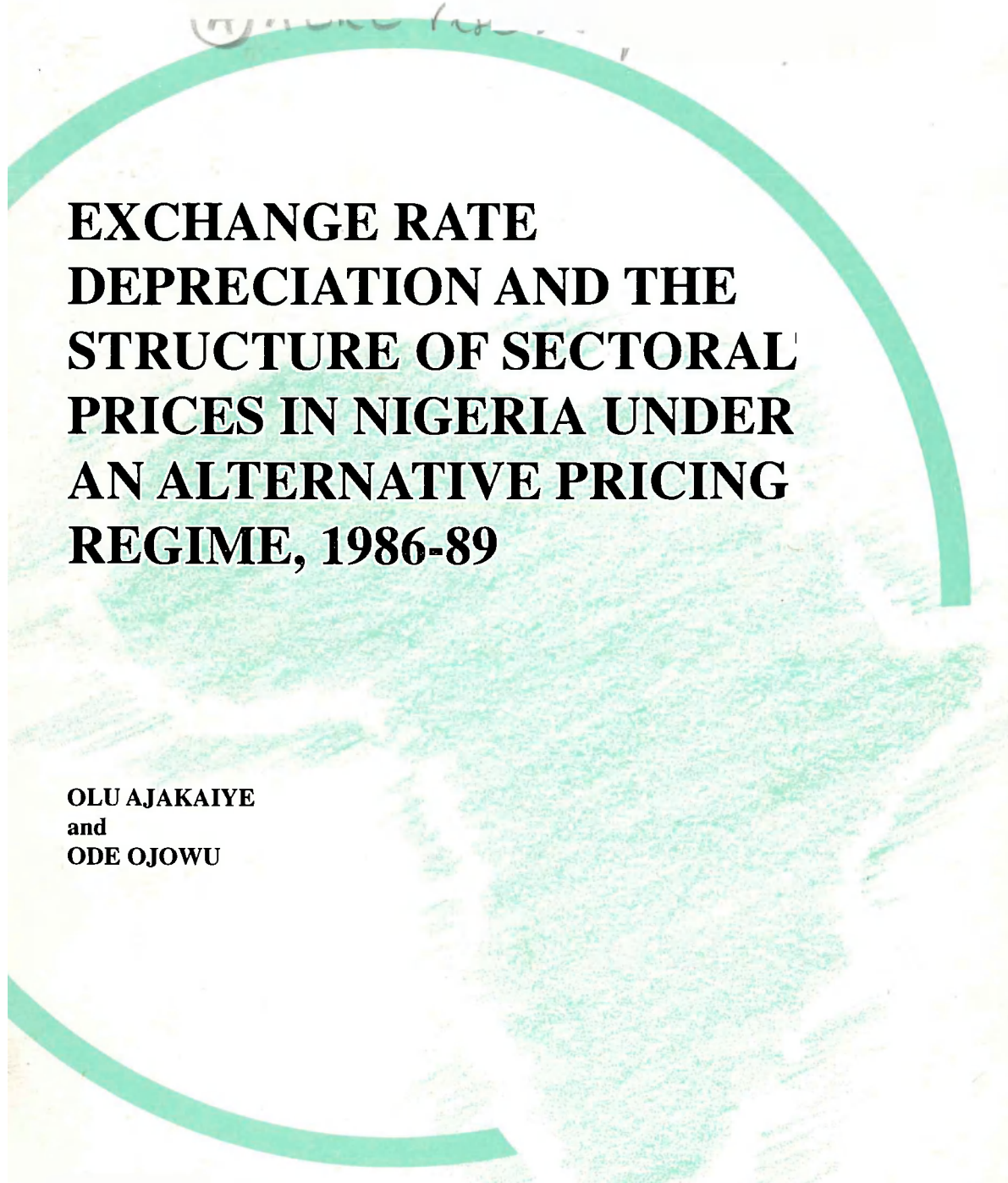
Exchange rate depreciation and the structure of sectoral prices in Nigeria under an alternative pricing regime, 1986–89

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Exchange rate depreciation and the structure of sectoral prices in Nigeria under an alternative pricing regime, 1986–89

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Abstract

Exchange rate reform is the centre-piece of Nigeria's Structural Adjustment Programme (SAP). It is expected to 'work' by altering the structure of relative prices, thereby eliciting the necessary responses from maximizing producers and consumers to shift resources so as to minimize dependence on imports, diversify the export base away from oil and put the economy back on the path of sustainable non-inflationary growth. The efficacy of exchange rate depreciation since the 1986 SAP, in terms of altering the structure of relative prices, is therefore of paramount importance to the overall success of the programme.

The effectiveness of exchange rate depreciation in altering the structure of relative prices varies with the prevailing pricing regime. This is so especially in an economy like Nigeria's, where production in all sectors depends directly or indirectly on imported inputs. Moreover, the prevailing pricing policy can be quite sensitive to public policy. Since the effects of exchange rate depreciation on relative prices cannot be determined, *a priori*, a model for simulating the impacts of exchange rate depreciation on sectoral prices under alternative pricing regimes was developed and simulated under three pricing regimes: fixed mark-up, replacement cost mark-up and mixed (selective fixed and replacement cost) mark-up.

The mixed mark-up pricing regime was found to be the one under which exchange rate depreciation would have altered relative prices most without excessive inflationary pressure. This provided the basis for determining the implications of pricing policies consistent with a mixed mark-up pricing regime.

I Introduction

Exchange rate reform is the centre-piece of Nigeria's Structural Adjustment Programme (SAP) (Tallroth, 1987). As a major element in the adjustment programme, whose basic strategy is to deregulate the economy and enhance the role of market forces in the co-ordination of economic activities, the efficacy of liberalizing the exchange rate can (and probably should) be judged on the basis of its contribution to changes in relative prices. This is necessary because SAP is expected to work through appropriate changes in the structure of relative prices to achieve its primary objective of 'altering and realigning aggregate domestic expenditure and production patterns so as to minimize dependence on imports; enhance the non-oil export base; and bring the economy back to the path of steady and balanced growth' (FRN, 1986, p.8).

Although exchange rate reforms are expected to affect developments in the economy in several ways (see Ajakaiye, 1991; Chhibber et al., 1989; Bird, 1983, for some of the channels through which exchange rate reforms can affect developing economies), given the objective of SAP, it is reasonable to assume that its effectiveness in altering relative price structure is paramount. For example, it is through its effect on the structure of relative prices that maximizing consumers and producers are expected to respond by shifting expenditure and resources to minimize dependence on imports and diversify the export base away from oil. The end result of this process is expected to be steady and balanced economic growth. Indeed, the resource shifts that should accompany the relative price changes lie at the root of the aims of economic reconstruction, social justice and self-reliance which SAP policies have in Nigeria.

While there is no controversy about the impact of exchange rate depreciation on domestic prices (Bird, 1983), the magnitude of this impact is always an empirical question (Cooper, 1971; Krugman and Taylor, 1978; Krueger, 1978; Osagie, 1985). Basically, the degree to which exchange rate depreciation causes an increase in domestic prices in developing countries will depend crucially on the degree to which domestic production processes depend upon imported products (these include raw materials, machinery and equipment as well as expatriate

workers with critical skills occupying management positions). Moreover, the degree to which imports are competitive in the technical sense (Ajakaiye, 1985) will significantly affect the impact of the exchange rate depreciation on the level of domestic prices. Also, the degree to which the labour unions are subject to money illusion and powerful enough to seek and secure compensatory wage increases when prices rise due to exchange rate depreciation, will have a serious impact on domestic price levels. The influence of excessive money supply and the associated demand pressures on prices must be recognized but this influence may be more in terms of the level rather than the structure of sectoral prices. Probably the most important impact is the influence of different pricing regimes on the structure of relative prices, which is likely to accompany exchange rate depreciation.

While most of the factors mentioned tend to have somewhat uniform effects on domestic prices, the pricing regimes tend to have varied effects. In Nigeria, where the Productivity, Prices and Incomes Board (PPIB) has become essentially redundant, it is reasonable to assume that producers in most sectors are now free to determine the price of their goods with minimum direct government intervention. The role of the PPIB had been to regulate the pricing behaviours of the producers who operate in essentially oligopolistic market structures and normally determine the prices of their products as mark-ups on costs, hereinafter referred to as mark-up pricing. The temptation, however, is to assume that with the exit of PPIB, all producers will decide to pass on as far as possible increases in their costs to prices under a fixed mark-up pricing regime.

Nevertheless, since SAP is premised on individual choices, it should be expected that different producers and consumers are likely to make different choices. In essence, the universal pursuit of a fixed mark-up pricing regime, where the mark-ups may be influenced by excess demand initially, but remain fixed in the short term, is one possibility. Other possibilities include 'replacement cost' pricing and real income preservation pricing, both of which are variants of flexible mark-up pricing.

The proposition is that the efficacy of exchange rate depreciation in altering the structure of relative prices is not neutral with respect to the prevailing pricing regime. Needless to say, there are several plausible pricing regimes that may prevail in various sectors of any economy. It is, therefore, important to analyse the structure of relative prices likely to accompany exchange rate depreciation under alternative pricing regimes, that are plausible in the context of a specific economy.

The purpose is to identify the pricing regime under which exchange rate depreciation is likely to elicit the greatest change in the structure of relative prices. Since the prevailing pricing regime can be significantly influenced by appropriate policies, this information should provide a useful guide to the design of policies necessary to complement exchange rate reforms.

The primary objective of this study, therefore, is to analyse the structure of relative prices likely to accompany exchange rate depreciation under alternative pricing regimes in Nigeria between 1986 and 1989. For this purpose, we develop a model of sectoral prices useful in simulating the impact of exchange rate on sectoral prices under a wide range of pricing regimes. This is analytically solved under a number of pricing regimes to demonstrate its suitability for the present purposes. The model is subsequently simulated to obtain the vectors of sectoral prices corresponding to three alternative pricing regimes in Nigeria given the average annual exchange rate depreciation between 1986 and 1989. The simulation results are analysed to identify the pricing regime under which exchange rate depreciation is likely to elicit the largest change in the structure of relative prices in Nigeria. On the basis of the findings, certain policy implications are then drawn.

II The model

Versions of the basic input-output price model have been used to analyse the sectoral price effects of several policies and events. For example, Young (1976) used a version of the model to analyse the process whereby cost changes at the primary and intermediate input levels are ultimately reflected in the Canadian retail food prices. Also in 1976, Uliel (1976) used another version to analyse the sectoral price effects of changes in wage rates, profit rates and the cost of imported intermediate inputs in the South African economy. Almon *et al.* (1979) used yet another version of the input-output price model to trace the full (direct and indirect) effects of deregulation of domestic oil in the United States. Ajakaiye (1985) has modified the basic model and used it to analyse the effects of liberalising the prices of selected public enterprises on all other sectoral prices in Nigeria. The input-output price models are usually integrated into various versions of the Computable General Equilibrium (CGE) models to analyse and measure the economy-wide effects of several policies having immediate or eventual impacts on relative prices.

Model specification

For present purposes, consider an economy in which production takes place according to the Leontief production function. Suppose also that the economy depends on imported intermediate inputs, expatriate labour and foreign financial capital. The input-output price model for such an economy can be written as:

$$(1) \qquad P' = P'A_h + (1+e) P^{*'}A_f + w'_h + (1+e) w'_f \\ + d' + r'_f + (1+e) r'_f + t' - s'$$

where

P'	=	1 x n vector of index of sectoral prices
A_h	=	n x n technology matrix of locally sourced intermediate inputs
A_f	=	n x n technology matrix of imported intermediate inputs
e	=	exchange rate depreciation (appreciation) index
$p^{*'}$	=	1 x n vector of index of dollar price ofimported intermediate inputs
$w'h$	=	1 x n vector of wages per unit of output in respect of indigenous workers
w'_f	=	1 x n vector of wages per unit of output in respect of expatriate workers
d'	=	1 x n vector of depreciation
r'_h	=	1 x n vector of per unit profit accruing to indigenous investors
r'_f	=	1 x n vector of per unit profit accruing to foreign investors
t'	=	1 x n vector of per unit indirect taxes
s'	=	1 x n vector of per unit subsidies

Equation (1) says that sectoral per unit prices must be high enough to cover the per unit cost of locally sourced $(P'A_h)$ and imported $(1+e)$ $P^{*'}A_f)$ intermediate inputs, per unit wages paid to the indigenous (w'_h) and foreign $((1+e)$ $w'_f)$ workers, depreciation allowance (d'), per unit profit paid to indigenous (r'_h) and foreign $((1+e)$ $r'_f)$ investors, per unit indirect taxes (t') less per unit subsidies (s'). Young (1976) has shown that this price equation is consistent with the behaviour of a cost minimizing producer whose production function is homogenous of degree one and the price elasiticity of demand for its output is given.

Analytical solution of the model

Suppose that producers pursue a mark-up pricing policy. Suppose also that the basic (prime) cost is made up of intermediate inputs, labour, depreciation and net indirect taxes, then Equation (1) can be specified and simplified to obtain:

$$(2) \qquad\qquad P^{\prime} = V^{\prime} B$$

where

$$
\begin{aligned}
V^{\prime} &= (1+e)\ (P^*A_f + W^{\prime}_f) + W^{\prime}_h + d^{\prime} + t^{\prime} - s^{\prime} \\
B &= (I\text{-}A\ (I + M))^{-1} \\
M &= n \times n \text{ diagonal matrix of the profit mark-ups.}
\end{aligned}
$$

From Equation (2) it can be seen that sectoral prices are functions of exchange rates, international prices of imported intermediate inputs, per unit wages, depreciation, indirect taxes, subsidies and profit mark-ups.

In functional form, sectoral prices can be specified as follows:

$$(3) \qquad\qquad P^{\prime} = P^{\prime}\ (e, P^{*\prime}, w^{\prime}, d^{\prime}, t^{\prime}, s^{\prime}, m^{\prime})$$

where

$$
m^{\prime} = 1 \times n \text{ vector of sectoral profit mark-ups.}
$$

All other variables are as specified earlier.

Suppose that the sectoral profit mark-ups, in the simple case (abstracting from expatriate labour and foreign investment peculiarities), are functions of price elasticities of demand, expected dollar prices of imported intermediate inputs, expected exchange rate and government regulatory posture. In symbols, this can be written as:

$$(4) \qquad m^{\prime} = m^{\prime}\ (\lambda, \grave{e}, P^*, R)$$

where

m'	=	1 x n vector of profit mark-ups
λ	=	price elasticity of demand
$\grave{e}$	=	expected exchange rate
$P*$	=	expected international price of imported intermediate inputs
R	=	Government regulatory posture

Correspondingly, equation (3) becomes:

(5) $P' = P'\,(e, P*', w', d', t', s', m'\,(\lambda, \grave{e}, P, R))$

where all variables are as specified earlier.

Observers of the Nigerian situation will find that the influence of demand forces on domestic prices is relatively insignificant (FRN, 1990b). In any case, there is no compelling reason to assume that the price elasticities of demand for most products will change significantly in the short term in Nigeria. As such, in the short term at least, the flexibilities of mark-ups is unlikely to be due to changes in price elasticities of demand.

However, mark-ups are likely to be quite sensitive to continuous exchange rate depreciation, the rising dollar price of imported intermediate goods and a liberal government price regulatory posture in respect to the commercialised public enterprises and other relevant sectors. For simplicity's sake, it can be assumed that the international prices of the imported intermediates will remain largely unchanged in the short term. Similarly, will be assumed that all sectoral per unit depreciation, indirect taxes and subsidies remain unchanged. Accordingly, Equation (5) becomes:

(6) $P'_t = P'_t\,(e_t, w', m'\,(\grave{e}_t, R))$

where all variables are as specified earlier.

Equation (6) can be used to analyse the impact of exchange rate depreciation on sectoral prices under several alternative pricing regimes.

Universal fixed mark-up pricing regime

Suppose that all producers pursue a fixed mark-up pricing policy, in which case profit mark-ups once determined remain unchanged. Then Equation (6) becomes:

$$(7) \qquad P_t^I = P_t^I (e_t); \; dP_t^I = \frac{\delta P_t^I}{\delta e_t} \, de > 0$$

where

dP_t	=	Total change in the vector of sectoral prices
$\delta P_t^{\prime} / \delta e_t$	=	Change in the vector of sectoral prices with respect to a change in exchange rates.
de	=	Change in exchange rates.

All other variables are as specified earlier.

Equation (7) says that under a fixed mark-up pricing regime, current sectoral prices will increase when the exchange rate depreciates. Intuitively, the impacts of exchange rate depreciation on sectoral prices under this pricing regime will be limited to the full (direct and indirect) effects of the associated increase in imported intermediate input, having abstracted from the influence of expatriate labour and foreign investment peculiarities.

Universal flexible mark-up pricing regime with adaptive expectation

Alternatively, suppose that all producers pursue a flexible mark-up pricing policy, in which case they alter their profit mark-ups in the current period on the basis of the actual exchange rate observed during the immediate past period. This scenario can be referred to as a flexible mark-up pricing regime with adaptive expectations. In that case, Equation (6) becomes:

$$P_t^i = P_t^i (e_t, m^i (e_{t-1});$$

(8)
$$dP_t = \frac{\delta P_t^i}{\delta e_t} de_t + \frac{\delta P_t^i}{\delta m_t^i} \cdot \frac{\delta m_t^i}{\delta e_{t-1}} de_{t-1} > 0$$

where:

e_{t-1} =   exchange rate observed during the preceding period.

All other variables as specified earlier.

Equation (8) says that under the flexible mark-up pricing regime characterised above, sectoral prices will increase as a result of the full (direct and indirect) effects of the increase in imported intermediate input cost due to:

current exchange rate depreciation $\left(\dfrac{\delta P_t}{\delta e_t} \right) de_t$ and the adjustments in

profit mark-ups due to past exchange rate depreciation $\left(\dfrac{\delta P_t^l}{\delta m_t^l} \cdot \dfrac{\delta m_t^l}{\delta e_{t-1}} \right) de_{t-1} \cdot$

It is easy to see that the impacts of exchange rate depreciation under this pricing regime will be greater than those likely under the fixed mark-up pricing regime if the exchange rate depreciated in the preceding period.

Universal flexible mark-up pricing regime with rational expectation

Another alternative is for all producers to pursue a flexible mark-up pricing policy where profit mark-ups in the current period will be altered on the basis of the exchange rate likely to be observed in the next period. Suppose, for simplicity's sake, that all producers have perfect foresight, and that they will all alter their profit mark-ups on the basis of the exchange rate observable in the next period. In this case, Equation (6) becomes:

$$P_t^l = P_t^l \ (e_t, \ m_t^l \ (e_{t-1});$$

(9) $dP_t^l = \dfrac{\delta P_t^l}{\delta e_t} \ de_t + \dfrac{\delta P_t^l}{\delta m_t^l} \cdot \dfrac{\delta m_t^l}{\delta e_{t+1}} \ de_{t-1} > 0$

Equation (9) says that under the flexible mark-up pricing regime characterised above, sectoral prices will increase as a result of the full (direct and indirect) effects of the increase in imported intermediate input cost due to:

current exchange rate depreciation $\left(\dfrac{\delta P_t}{\delta e_t} \right) de_t$ and the adjustment in

sectoral   profit   mark-ups   due   to   future   exchange   rate   depreciation

$$\left(\frac{\delta P_t'}{\delta m_t'} \cdot \frac{\delta m_t'}{\delta e_{t-1}} \right) de_{t-1}$$

It is also intuitive to expect that the impacts due to adjustments in profit mark-ups under this scenario will be larger than those likely under the preceding scenario if the exchange rate continues to depreciate.

Mixed pricing regimes

It is clear that the pricing regimes analysed so far are universal in nature. Nevertheless, the model can also be used to analyse several cases of mixed pricing regimes. For example, it can be used to analyse the sectoral price effects of exchange rate depreciation under a pricing regime where producers in certain sectors pursue fixed mark-up pricing, while others pursue either of the two flexible mark-up pricing.

The model can also be analytically solved to obtain the impacts of exchange rate depreciation when certain producers pursue any of the mark-up pricing and per unit wage costs in some sectors are indexed to inflation. The method of matrix partitioning can be employed in analysing these mixed cases.

The above provides insights into the relative magnitudes of the impact of exchange rate depreciation under different pricing regimes. For example, it can be seen that the sectoral price effects of a specific exchange rate depreciation under a universal fixed mark-up pricing are smaller in magnitude compared to those of a universal flexible mark-up pricing with rational expectation. It can also be stated, *a priori*, that in a situation of continuous exchange rate depreciation, the increases in sectoral prices under this flexible mark-up pricing regime will be larger than those under a universal flexible mark-up pricing with rational expectation.

Nevertheless, the actual magnitudes can only be determined empirically. Correspondingly, the change in the structure of relative prices for a given exchange rate under a specific pricing regime can only be determined empirically.

III Empirical application of the model

The data

To apply empirically the model specified and analysed in the preceding section, the following sets of data will be required:

- A matrix of locally produced intermediate input coefficients (A_h);
- A matrix of imported intermediate input coefficients (A_f);
- Exchange rate depreciation index (e);
- A vector of indices of international prices of imported intermediate inputs $(P^{*'})$;
- A vector of sectoral per unit wages paid to nationals (w'_h);
- A vector of sectoral per unit wages paid to foreigners (w'_f);
- A vector of sectoral per unit depreciation (d');
- A vector of sectoral per unit profits (r');
- A vector of sectoral per unit indirect taxes (t');
- A vector of sectoral per unit subsidy (s').

The latest available official input-output table for Nigeria relates to 1973 and was only published in 1981 (FRN, 1981). However, several researchers have made efforts to compile input-output tables for more recent years, using limited primary data. In this regard, the ongoing efforts by researchers in the Economic Development Department of the Nigerian Institute of Social and Economic Research (NISER), Ibadan; the Centre for Econometric and Allied Research (CEAR) of the University of Ibadan; the Policy Analysis Department (PAD) of the (A) Federal Ministry of Industries, and consultants such as Coopers and Lybrand are notable. However, as results of various research endeavours, these input-output tables elaborated on different sectors while compressing others, depending on the objective of the research. Consequently, different results can be obtained

depending on the input-output table adopted for simulation purposes.

For the present purpose, however, the 1980 input-output table available at NISER (which is itself largely an update of the 1973 table but with considerable primary data, especially for the manufacturing sector) has been updated to 1985. The method used in updating the table has been described elsewhere (Ajakaiye, 1989). From the 1985 table it is possible to extract the following sets of data:

- Matrix of locally produced intermediate input coefficients (A_h);
- A vector of imported intermediate input coefficients (a');
- A vector of sectoral per unit wages (w');
- A vector of sectoral per unit depreciation (d');
- A vector of sectoral per unit operating surplus (Z');
- A vector of sectoral per unit indirect taxes (t');
- A vector of sectoral per unit subsidies (s').

The input-output flow table for 1985 from which this data can be extracted is in Appendix A.

As can be seen from Appendix A, there are 18 activity sectors. Correspondingly, the dimension of the coefficient matrix is 18 x 18 while each of the vectors also has 18 elements. Notice that the much-desired matrix of imported intermediate input coefficients is not obtainable. In its place, the vector of imported intermediate coefficients so far obtained has been used. Observe also that the vector of international prices of imported intermediate inputs is not available. Nevertheless, since the table is in value terms, it is easy to show that all sectoral prices are, in fact, price indices and that in the base period all sectoral price indices are normalised to one. However, for present purposes, it is assumed that these international prices remain constant throughout the relevant period. Notice also that instead of a vector of profits per unit of output, a vector of operating surplus is available. Data on average exchange rates are obtained from the Central Bank of Nigeria (CBN) and the associated depreciation rates for the period between 1986 and 1989 have been computed and used.

Base run

Equation (2) has been calibrated for 1985 and, being the base year, all calculated

sectoral prices were identically equal to one. The indication is that both the data and the computer algorithm adopted for the calibration are appropriate. Thus, the model can be used to simulate the effects of exchange rate depreciation witnessed in Nigeria between 1986 and 1989 on sectoral prices under alternative mark-up pricing regimes.

IV Model simulation

As indicated earlier, the model can be used to analyse and measure the impacts of exchange rate changes under several pricing regimes. Nevertheless, the pricing regimes selected for simulation purposes should be reasonable in the context of the relevant economy. Therefore, a brief review of the plausible pricing regimes in the context of contemporary Nigeria is pertinent. To begin with, however, it is instrumental to discuss briefly the trend of the naira exchange rate between 1985 and 1989 as well as the other complementary policies implemented during the period. Against this background, the pertinence of the simulation results for Nigeria can be better appreciated.

Trend of naira exchange rate, 1985-89

Soon after its liberalization in September 1986, the naira exchange rate depreciated from approximately one naira to the US dollar before June 1986, to over four naira to the US dollar by September 1986 (see Table 1). The naira exchange rate continued to depreciate such that by December 1989 it had reached 7.6221 naira to the dollar. As can be seen from Table 2, the average annual exchange rate, which was 0.8925 naira to the dollar in 1985, had depreciated to an average annual rate of 7.3584 naira to the dollar by 1989. Using 1985 as the base, it can be seen that by 1989 the naira exchange rate had depreciated by 87.8%.

Evidently, the expected dramatic depreciation of the naira had occurred, which was considered over-valued in the pre-1986 era. In fact, the depreciation is quite consistent with the overall objective of liberalizing the economy, namely, to allow all prices, including the exchange rate to reflect the true scarcity values of the relevant resources. In this connection, the depreciation of the naira is quite appropriate, since Nigeria's export earnings declined from about $12.57 billion in 1985 to a mere $6.23 billion in 1989. Similarly, the continuous depreciation of the naira is to be expected since the amount of foreign exchange earnings devoted to

funding the Foreign Exchange Market (FEM) did not reach the $3 billion mark
between 1987 and 1989 whereas the 'demand' was always far in excess of $3
billion throughout the period, being over $17 billion in 1989.

Table 1   Average monthly exchange rate, 1986–89 (naira/dollar)

Month	1986	1987	1988	1989
January	1.004	3.6447	4.1749	7.2441
February	1.004	3.7013	4.2611	7.3828
March	0.9984	3.9212	4.2663	7.5871
April	0.9818	3.8857	4.2023	7.5808
May	0.967	4.1408	4.1093	7.5051
June	0.889	4.0305	4.1916	7.3477
July	0.889	3.7889	4.6087	7.1388
August	0.889	4.0752	4.583	7.2583
September	4.1958	4.186	4.7167	7.343
October	4.0675	4.255	4.7748	7.3934
November	3.5134	4.2224	5.1479	7.5035
December	3.2505	4.1204	5.353	7.6221
Average	1.271	4.096	4.5325	7.4651

Source: Central Bank of Nigeria, Lagos.

Table 2   Average annual exchange rate of the naira 1985–89 (N = $1.00)

Year	Exchange rate	Annual depreciation rate (%)	Depreciation rate (1985 base) (%)
1985	0.8924	-	-
1986	1.2711	29.79	29.79
1987	4.0096	68.3	77.74
1988	4.5045	10.99	80.19
1989	7.3584	38.78	87.87

Source: Computed from data obtained from *Economic and Statistical Review*, 1989, Table 13b, p. 37, Federal Ministry of Budget and Planning, Lagos.

Complementary policies

Soon after the establishment of the Second-tier Foreign Exchange Market (FEM) in September 1986, the Government liberalized prices of agricultural exports and deregulated domestic prices. Accordingly, the marketing boards were swiftly wound up and their assets sold. Similarly, the erstwhile PPIB, which was responsible for issuing the Prices and Incomes Policy Guidelines soon after the Budget Speech, became almost redundant. By 1987, the familiar standard verse, namely, that before any producer in the modern sector can increase its price the PPIB must be convinced that there has been an increase in production costs, and that absorbing such a cost increase will have injurious effects on the profitability of the producer, was expunged. As such, by 1987, the price liberalization process had been completed. What remains, therefore, is for the structure of relative prices to change, thereby providing the necessary incentives for the economy to perform as expected.

The main pricing policies in Nigeria

Observers of Nigeria will find that although the commodity boards have been dismantled and the role of the PPIB as a price control agency has been abrogated, several prices are still regulated by the government. For example, prices of petroleum products have increased several times since 1986, but only when it pleased the government. Transport fares, including private sector-dominated road transport, are rarely increased without the prior approval of the government.

Similarly, private-sector participation in air transport not withstanding, air fare increases are also subject to government approval. Even the commercialized public enterprises have yet to obtain complete autonomy when it comes to pricing policy. Thus, while electricity, water rates and communication charges may have increased slightly more frequently in recent times, such increases are not autonomously determined by the relevant enterprises. Thus, quite a number of important prices are regulated in Nigeria and, as such, establishments occupying these sectors may be considered to be operating under a fixed mark-up pricing regime.

Flexible mark-up pricing with rational expectation is reasonable in an economy like Nigeria's when costs are rising systematically as a result of the continuous depreciation of the exchange rate and where production depends heavily on imported capital and intermediate inputs. In such a situation, producers will tend to price their finished products on the basis of the expected cost of procuring necessary inputs for production in the next round and not on the basis of the cost incurred in the production of the existing products. A recent study on causes of high prices of locally manufactured goods revealed that this practice has become prevalent in the Nigerian manufacturing sector (FRN, 1990b).

It is also quite unlikely that other import-dependent producers will behave differently. In the case of agriculture, for example, after over 20 years of agricultural extension services, Nigerian peasant farmers have accepted new farming techniques incorporating the considerable use of chemicals and fertilisers. At the moment, most fertilisers are imported. In the face of exchange rate depreciation, the naira-cost of fertilisers has been going up (Akinyosoye, 1991). The same is true for chemicals (Akande, 1989).

It is recognised that the market for agricultural commodities is reasonably competitive. Nevertheless, it should be noted that all farmers face the same cost with imported inputs. Moreover, the price elasticity of demand for agricultural

produce, especially for food, is usually low. Similarly, the industrial demand for agricultural raw materials tends to be price inelastic because of the fixity of the technical coefficients, at least in the short term. Therefore, a mark-up pricing regime is a reasonable proposition for the Nigerian agricultural sector, its competitive market structure notwithstanding.

More important is the fact that farmers produce to earn income which should be high enough to cover their minimum consumption expenditures, especially on non-farm goods and services. In an environment characterized by a high and rising inflation rate, farmers should be expected to price their goods on the basis of the nominal values of other commodities and services they require. This pricing behaviour, which can be termed 'real income preservation' pricing is another version of a flexible mark-up pricing regime and may partly explain the phenomenon of a consistently higher food price index relative to the index for all items in Nigeria, especially since the 1980s.

From this, it is evident that several pricing regimes may prevail in different sectors of an economy such as Nigeria's, ranging from the fixed mark-up pricing regime to variants of flexible mark-up pricing regimes identified above. Moreover, the determinants of the specific mark-ups in the flexible cases may be quite different.

V Analysis of results

Against the background of the trend in the naira exchange rate between 1985 and 1989, the complementary policies implemented so far and a review of the main pricing policies prevailing in the Nigerian economy, the model has been simulated under three different pricing regimes. It should be emphasised that the primary objective of this study is to examine the contributions of exchange rate depreciation to changes in the structure of sectoral prices under alternative pricing regimes. As such, the coefficients of variation for each of the simulated sectoral prices are examined and compared with those of the actual sectoral prices for the period between 1986 and 1989. Inevitably, the central tendencies (the means) of the various vectors of sectoral prices will be different. Therefore, the coefficients of variation, which are normalized standard deviations, are quite suitable for the kind of comparative analysis of changes in the structure of relative prices envisaged.

Universal fixed mark-up pricing regime

Under this scenario, exchange rate depreciation affects sectoral prices only as a result of the increases in imported intermediate input cost which it occasioned. Therefore, the simulation results reflect the impacts of the exchange rate depreciation on sectoral prices between 1986 and 1989 through the channel of imported inputs only. The exchange rate depreciation rates are shown in Table 2.

The simulation results under this pricing regime are shown in Table 3. It is clear that under a universal fixed mark-up pricing regime, the exchange rate depreciation observed in Nigeria between 1986 and 1989 would have caused a generalised increase in sectoral prices. Moreover, note that the largest increases will occur in sectors that depend heavily on imported input regardless of whether or not outputs of such sectors are tradable. For example, the largest price increases

will occur in the building and construction (10), housing (18) and crude petroleum (5) sectors because they depend heavily on imported

Table 3   Simulated sectoral price effects of exchange rate depreciation under universal fixed mark-up pricing regime, 1986-89

	Sectors	1986	1987	1988	1989
1.	Agriculture	101.15	102.99	103.09	103.38
2.	Livestock	102.78	107.25	107.48	108.19
3.	Forestry	100.77	102.00	102.06	102.26
4.	Fishing	103.29	108.57	108.84	109.69
5.	Crude petroleum	109.00	123.49	124.23	126.55
6.	Other mining	103.35	108.74	109.01	109.88
7.	Large scale manufacturing	103.60	109.40	109.69	110.62
8.	Small scale manufacturing	101.91	105.00	105.15	105.65
9.	Utilities	102.22	105.80	105.98	106.55
10.	Building and construction	113.65	135.62	136.74	140.26
11.	Transport	104.01	110.46	110.79	111.82
12.	Communication	101.36	103.56	103.68	104.03
13.	Wholesale and retail trade	102.37	106.18	106.38	106.99
14.	Finance and insurance	101.02	102.66	102.75	103.01
15.	Production of government services	100.00	100.00	100.00	100.00
16.	Hotels and restaurants	101.72	104.50	104.64	105.09
17.	Real estate and business services	101.76	104.59	104.73	105.18
18.	Housing	113.65	135.62	136.74	140.26
	Average of simulated sectoral prices	103.76	109.80	110.11	111.08
	Average of actual sectoral prices	112.83	135.00	151.00	184.50

Note: Averages of actual sectoral prices are computed from the data in Appendix B.
Source: Model simulation results and actual sectoral indices are shown in Appendix B.

inputs, as can be seen in Appendix A. On the other hand, the smallest price increases will occur in the agricultural (1) and forestry (2) sectors because they depend least on imported inputs (see Appendix B, column 1). On the basis of these findings, Ajakaiye (1991) has pointed out that dichotomizing between tradable and non-tradable goods, when analysing the impacts of exchange rate depreciation on relative prices in an undecomposable economy which is dependent on imported inputs, is rather simplistic and may mislead policy makers.

The last two rows of Table 3 show the simple averages of the simulated and actual sectoral prices. Note that under this pricing regime, the averages of actual sectoral prices exceeded those of the simulated prices. The indication is that the exchange rate depreciation witnessed between 1986 and 1989 alone could not have put severe upward pressure on the general price level if all producers had pursued a fixed mark-up pricing policy.

Table 4 shows the coefficients of variation for the actual and simulated sectoral prices. Clearly, under this pricing regime, exchange rate depreciation will lead to certain changes in the structure of relative prices. From column 2 of Table 4, it can be seen that the coefficient of variation for the vector of simulated sectoral prices increased from less than 0.04 in 1986 to about 0.11 in 1989. Since the exchange rate is the only variable that changed in the model, the indication is that there is a positive correlation between exchange rate depreciation and changes in relative prices, *ceteris paribus*.

Table 4 Coefficients of variation of actual and simulated sectoral
prices under universal fixed mark-up pricing regime, 1986-89

Year	Actual	Simulated	Simulated/ actual (%)
1986	0.1307	0.0393	30.07
1987	0.3627	0.0971	26.77
1988	0.3159	0.998	31.59
1989	0.677	0.1089	16.03

Source: Computed from Table 3 and Appendix B.

As regards the contributions of exchange rate depreciation to the observed changes
in the structure of relative prices, the ratios of the coefficients of variation for
simulated sectoral prices to those of the actual prices are revealing. From column
3 of Table 4, it can be seen that the contributions of exchange rate depreciation
to the changes in relative prices generally declined between 1986 and 1989,
although its contribution peaked in 1988 at 31.6%. The indication is that under
this pricing regime, the exchange rate would have had to depreciate precipitously
if it were to account for about 50% of the actual changes in the structure of
sectoral prices observed between 1986 and 1989.

Universal flexible mark-up pricing regime with rational expectation

Under this scenario, exchange rate depreciation will affect sectoral prices in two
ways. First, the increases in imported intermediate input costs will lead to
increases in prices as they did under the preceding scenario. Second, producers
will increase profit mark-ups by the proportionate increases in the expected costs

of imported inputs per unit of output. It is assumed, for simplicity's sake, that producers have perfect knowledge such that they can correctly predict future exchange rate depreciation.

The simulation exercises under this scenario have been carried out using both the exchange rate depreciation for the current period, with 1985 as the base year, and the annual exchange rate depreciation for the next period. The data on current period exchange rate depreciation were used to reflect the increase in cost of imported inputs, while profit mark-ups have been increased by the proportionate increase in the cost of imported input expected during the next period using the annual exchange rate depreciation figures for the following period. The exchange rate depreciation figures used to capture these two effects on sectoral prices between 1986 and 1989 are in Table 5.

Table 5   Exchange rate depreciation, 1986-89

Year	Current exchange rate depreciation (%) (base = 1985) e_t	Future exchange rate depreciation (annual %) (e_{t+1})
1986	29.79	68.30
1987	77.74	10.99
1988	80.19	38.78
1989	87.87	7.47

Table 6 Simulated sectoral price effects of exchange rate depreciation under universal
flexible mark-up pricing regime with rational expectation, 1986-89

	Sectors	1986	1987	1988	1989
1.	Agriculture	102.35	104.39	105.04	105.51
2.	Livestock	105.11	110.05	111.40	112.51
3.	Forestry	101.34	102.70	103.05	103.34
4	Fishing	105.30	111.11	112.40	113.63
5.	Crude petroleum	113.94	129.70	132.93	136.18
6.	Other mining	105.86	111.84	113.36	114.67
7.	Large scale manufacturing	106.62	113.01	114.76	116.19
8.	Small scale manufacturing	103.52	106.91	107.84	108.60
9.	Utilities	103.65	107.61	108.52	109.36
10.	Building and construction	132.97	161.15	172.56	180.13
11.	Transport	106.98	114.11	115.91	117.48
12.	Communication	102.60	105.13	105.87	106.46
13.	Wholesale and retail trade	104.36	108.70	109.90	110.89
14.	Finance and insurance	102.05	103.97	104.58	105.04
15.	Production of government services	100.00	100.00	100.00	100.00
16.	Hotels and restaurants	103.57	106.90	107.98	108.78
17.	Real estate and business services	103.57	106.90	107.98	108.78
18.	Housing	132.97	161.15	172.56	180.13
	Average of simulated sectoral prices	107.58	114.71	117.00	118.72
	Average of actual sectoral prices	112.83	133.00	151.00	184.50

Note: Averages of actual sectoral prices are as for Table 3.
Sources: As for Table 3.

Notice also that the averages of simulated sectoral prices under this scenario are lower than those of actual averages. However, when compared with those of simulated sectoral prices under a fixed mark-up pricing regime, they are considerably higher. The indication is, therefore, that the exchange rate

depreciation witnessed in Nigeria between 1986 and 1989 would have put greater upward pressure on sectoral prices under flexible mark-up pricing with rational expectation than under a fixed mark-up pricing regime.

The simulated sectoral prices for the period 1986 to 1989 are presented in Table 6 while the coefficients of variation are shown in Table 7. A quick look at Tables 3 and 6 will show that the simulated sectoral prices in Table 6 are larger than those in Table 3, with the exception of those for producers of government services (15) which do not change. The vectors of difference between the simulated sectoral prices under this scenario and the corresponding ones under the preceding scenario represent the impact of increasing the profit mark-ups by the anticipated increase in the costs of imported intermediate inputs during the next period.

Turning to the changes in the structure of sectoral prices under this pricing regime in Table 6, it is clear that the changes are significantly higher than those of the preceding scenario. A comparison of the coefficients of variation in Tables 4 and 7 will show that the figure for 1986 in Table 7 is about 130% greater than the corresponding figure for Table 4. Similarly, the figures for 1987, 1988 and 1989 in Table 7 are greater than those in Table 4 by 62%, 83% and 84% respectively. As proportions of the coefficients of variation for the actual sectoral prices, the figures range between 69.09% in 1986 to 29.4 per cent in 1989. Again, it can be seen that the proportions generally declined between 1986 and 1989.

The result of this is that if all producers had pursued flexible mark-up pricing policy with rational expectation, the exchange rate depreciation witnessed between 1986 and 1989 would have worsened the inflationary tendencies in the economy compared with what would have happened under the fixed mark-up pricing. However, there would have been greater changes in the structure of relative prices compared to the situation under the fixed mark-up pricing regime. Evidently, exchange rate depreciation under this flexible mark-up pricing regime would have been more efficacious in changing the structure of relative prices in Nigeria between 1986 and 1989 compared with the situation under the fixed mark-up pricing regime. Nevertheless, the inflationary pressures associated with this scenario would have been greater than those under the preceding scenario.

Mixed mark-up pricing regime

This scenario is characterized by a mixture of fixed mark-up pricing and flexible mark-up pricing with rational expectation. It has been mentioned that, the liberalization posture of current policies notwithstanding, several prices are still regulated in Nigeria. As such, it should be pertinent to simulate the sectoral price effects of exchange rate depreciation under the more realistic scenario of a mixed mark-up pricing regime.

Table 7 Coefficient of variations of actual and simulated sectoral prices under universal flexible mark-up pricing regime with rational expectation, 1986-89

Year	Actual	Simulated	Simulated/ actual (%)
1986	0.1307	0.0903	69.09
1987	0.3627	0.1574	43.40
1988	0.3159	0.1829	57.90
1989	0.6770	0.1991	29.41

Source: Computed from Table 6 and Appendix B

Given the reality of the Nigerian situation, it seems reasonable to assume that mark-ups in the following sectors are fixed:

- Crude petroleum (5)
- Utilities (9)
- Transport (11)
- Communications (12)

In all other sectors, the pursuit of flexible mark-up pricing with rational

expectation, as detailed in the preceding scenario, is assumed.

Under the mixed mark-up scenario, prices in sectors pursuing the fixed mark-up pricing policy will be affected only by the increase in cost of imported inputs on account of exchange rate depreciation. However, prices of sectors pursuing the replacement cost mark-up pricing policy will be affected by the actual and anticipated increases in the cost of imported inputs on account of exchange rate depreciation.

In Tables 8 and 9, the simulation results for this scenario are presented. A comparative examination of Tables 8 and 6 will reveal that the simulated prices in Table 8 are generally lower than those in Table 6. Accordingly, the average prices in Table 8 are slightly lower than those in Table 6. It follows that under this pricing regime, inflationary pressure would have been slightly abated compared to the preceding scenario.

Table 8   Simulated sectoral price effects of exchange rate depreciation under mixed mark-up pricing regime, 1986-89

	Sectors	1986	1987	1988	1989
1.	Agriculture	102.35	104.24	104.83	105.28
2.	Livestock	104.23	109.30	110.34	111.34
3.	Forestry	100.86	102.12	102.23	102.44
4.	Fishing	103.71	109.12	109.61	110.54
5.	Crude petroleum	109.29	123.86	124.75	127.12
6.	Other mining	103.86	109.38	109.92	110.88
7.	Large scale manufacturing	105.93	112.16	113.56	114.86
8.	Small scale manufacturing	103.10	106.39	107.10	107.78
9.	Utilities	102.61	106.30	106.69	107.34
10.	Building and construction	132.43	160.47	171.56	179.01
11.	Transport	104.49	111.06	111.63	112.76
12.	Communication	102.11	104.53	105.03	105.54
13.	Wholesale and retail trade	103.22	107.29	107.93	108.71
14.	Finance and insurance	101.78	103.64	104.11	104.52
15.	Production of government services	100.00	100.00	100.00	100.00
16.	Hotels and restaurants	102.71	105.72	106.35	106.97
17.	Real estate and business services	103.05	106.27	107.08	107.79
18.	Housing	132.43	160.47	171.56	179.01

Table 8 continued

Sectors	1986	1987	1988	1989
Average of simulated sectoral prices	106.57	113.46	115.24	116.77
Average of actual sectoral prices	112.83	133.00	151.00	184.50

Note: Averages of actual sectoral prices are as for Table 3.
Source: See Table 6

From Table 9, it is clear that there will be a considerable change in the structure of relative prices. However, the tendency for the coefficient of variation to decline between 1986 and 1989 is exhibited under this scenario as well. Compared with the scenario of universal flexible mark-up pricing with rational expectation, it is obvious that the change in the structure of relative prices under this scenario is slightly bigger. As proportions of the coefficients of variation for the actual sectoral prices, the figures are the highest so far. The indication is that the exchange rate depreciation witnessed between 1986 and 1989 in

Table 9 Coefficients of variation of actual and simulated sectoral prices under mixed mark-up pricing regime, 1986-89

Year	Actual	Simulated	Simulated/ actual (%)
1986	0.1307	0.0907	74.29
1987	0.3627	0.1572	43.40
1988	0.3159	0.1836	58.12
1989	0.6770	0.2001	29.50

Source: Computed from Table 8 and Appendix B.

Nigeria would have been most efficacious in changing the structure of relative prices under this mixed mark-up pricing regime.

VI Summary of findings

In this study, the impact of exchange rate depreciation witnessed in Nigeria between 1986 and 1989 on the structure of sectoral prices under alternative pricing regimes was investigated. To this end, a model useful in simulating these impacts was developed, analysed and empirically applied. The model was simulated under three different mark-up pricing regimes: a fixed mark-up pricing regime; a flexible pricing with rational expectation; and a mixed mark-up pricing regime.

Table 10   Coefficients of variation for simulated sectoral prices, 1986-89

Pricing regimes

Year	Fixed mark-up	Flexible mark-up	Mixed mark-up
1986	0.0393	0.0903	0.0907
1987	0.0971	0.1574	0.1572
1988	0.0998	0.1829	0.1836
1989	0.1089	0.1991	0.2001

Source: same as for Tables 4, 7 and 9

In summary, Table 10 and Figure 1 show the coefficients of variation for the simulated sectoral prices under the three mark-up pricing regimes for the period between 1986 and 1989. As can be seen, throughout the period, the coefficients of variation under a fixed mark-up pricing regime were the lowest, followed by those for flexible mark-up pricing regime, while those for the mixed mark-up pricing regime were the highest. It follows that the influence of exchange rate depreciation on the structure of sectoral prices is not invariant with respect to the prevailing pricing regime. In the Nigerian context, of the three pricing regimes considered in this study, the influence of exchange rate depreciation on the structure of sectoral prices will be greatest under the mixed mark-up pricing regime.

Figure 1   Coefficients of variation of sectoral prices under alternative pricing regimes, 1986-89
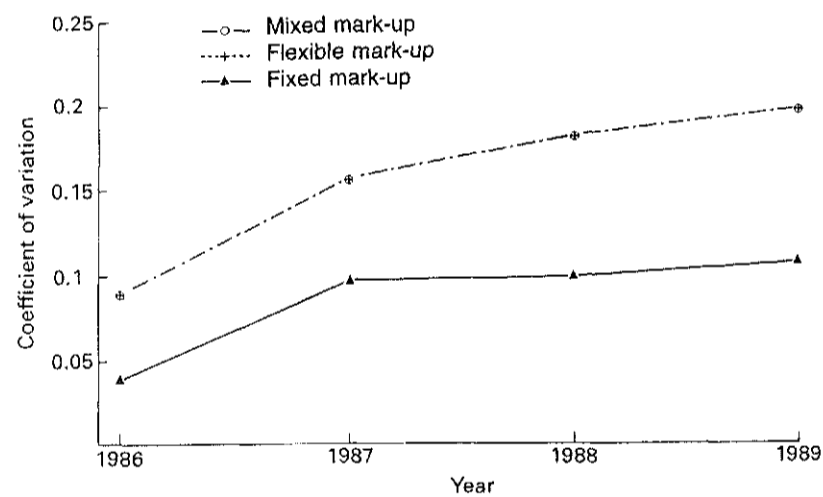

Table 11 and Figure 2 show that the inflationary consequences of exchange rate depreciation will be different for different pricing regimes. Of the three pricing regimes considered in this study, it can be seen that the average prices will be highest under the universal flexible mark-up pricing regime. The indication is that the pricing regime under which exchange rate depreciation causes the structure of sectoral prices to change the most may not necessarily be that under which the

inflationary pressure will be the greatest. In the present study, whereas exchange rate depreciation will cause the greatest changes in the structure of sectoral prices under the mixed mark-up pricing regime, it will cause the greatest upward pressure on prices under the universal flexible mark-up pricing regime.

Table 11   Simple averages of simulated sectoral prices, 1986-89 (1985 = 100)

Pricing regimes

Year	Fixed mark-up	Flexible mark-up	Mixed mark-up
1986	103.76	107.58	106.57
1987	109.80	114.71	113.46
1988	110.11	117.00	115.24
1989	111.08	118.72	116.77

Source: same as for Tables 3, 6 and 8.

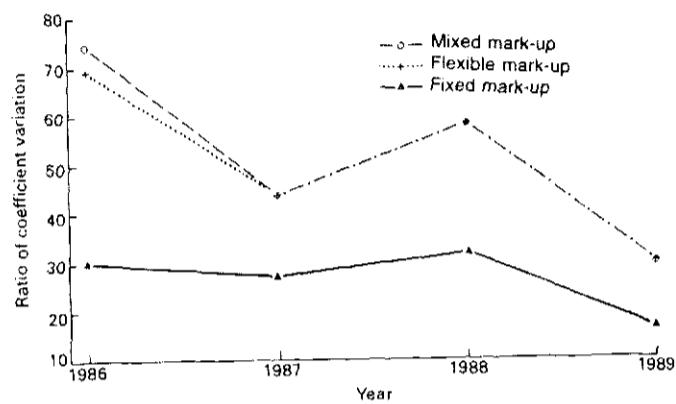**Figure 2** Inflationary effects of exchange rate depreciation under alternative pricing regimes, 1986-89
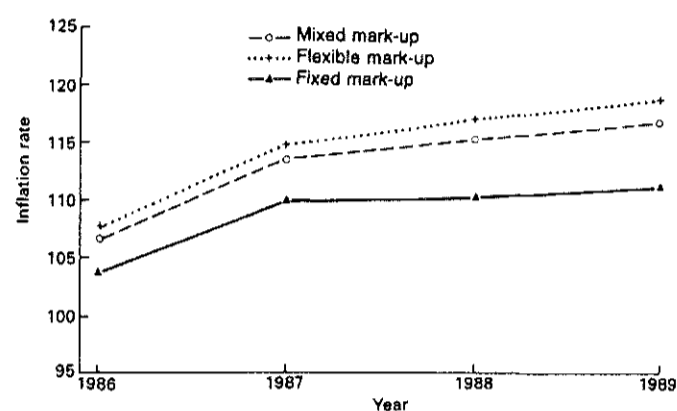
In terms of the contributions of exchange rate depreciation to changes in the structure of relative prices, the ratio between the coefficients of variation for simulated and actual prices shown in Table 12 and Figure 3 are quite revealing. Note from Figure 3 that the ratios between the coefficient of variation for simulated and actual sectoral prices were falling regardless of the pricing regime. This is a reflection of the consequence of implementing the various adjustment policies. Observers of Nigeria will recall that exchange rate liberalization, dissolution of the marketing boards and elimination of pricing policy from the income guidelines of the PPIB were the first set of policies to be implemented in 1986. By 1988, several other policies had been implemented. Prominent among these were the privatization and commercialization of public enterprises, deregulation of interest rates, wage increases and increases in the prices of petroleum products. For a detailed review of economic policy and development in Nigeria between 1986 and 1989, see Phillips and Ndekwu (1988) and Phillips and Ajakaiye (1991). All of these policies must have contributed to the changes in the structure of sectoral prices observed between 1986 and 1989. It is important to note that despite the multiplicity of policies implemented by 1989, the lowest contribution of exchange rate depreciation to the change in the structure of sectoral prices observed in 1989 was still above 16%, the figure under the fixed mark-up pricing regime. The indication is that exchange rate depreciation still remained an important contributing factor to the alteration in the structure of sectoral prices by 1989. Prior to 1989, its contribution was extremely important.

Table 12   Ratio between simulated and actual coefficients of variation of sectoral prices, 1986-89 (%)

	Pricing regimes		
Year	Fixed mark-up	flexible mark-up	Mixed mark-up
1986	30.07	69.09	74.29
1987	26.77	43.40	43.40
1988	31.59	57.90	58.12
1989	16.03	29.41	29.50

Source: Computed from Tables 4, 7 and 9.

Figure 3 Ratio between coefficient of variation for simulated and actual sectoral prices under alternative pricing regimes, 1986-89

Turning to the differential contribution of exchange rate depreciation to changes in the structure of sectoral prices, under different pricing regimes, it can be seen that, of the three pricing regimes considered in this study, the mixed mark-up pricing regime has the highest ratios between simulated and actual coefficients of variation throughout the period. For reasons mentioned earlier, the ratios declined from over 74% in 1986 to about 30% in 1989.

With regard to the contributions of exchange rate depreciation to inflation, the ratio between the simulated and the actual average sectoral prices, as shown in Table 13 and Figure 4, are incisive. Notice the general tendency for these ratios to decline over time regardless of the pricing regime. This is due to the fact that many more price escalating policies had been implemented by 1989. Again it must be recognised that exchange rate depreciation remained an important contributing factor to average sectoral price increase even under the fixed mark-up pricing regime. For the present purposes however, it is significant to note that of the three pricing regimes considered in this study, exchange rate depreciation accounted for the largest proportion of the actual average price increase under the universal flexible

mark-up pricing with rational expectation (see Figure 4).
The above indicates clearly that exchange rate depreciation
is capable of contributing the most to changes in the structure
of sectoral prices under the mixed mark-up pricing regime.
Under the same mark-up pricing regime, exchange rate
depreciation will put considerable pressure on prices, but this
is still less than that likely under a universal fexible mark-up
pricing with rational expectation. It can therefore be
concluded that of the three pricing regimes considered
reasonable in the Nigerian context, exchange rate
depreciation is likely to be most efficacious in significantly
altering the structure of relative prices under the mixed
mark-up pricing regime.

Table 13 Ratio between simulated and actual simple average sectoral prices,
1986-89 (%)

Pricing regimes

Year	Fixed mark-up	Flexible mark-up	Mixed mark-up
1986	91.96	95.35	94.45
1987	82.56	86.25	85.31
1988	72.92	77.48	76.32
1989	60.21	64.34	63.29

Source: Computed from Tables 3, 6 and 8.

Figure 4   Ratio between average simulated and actual sectoral prices under alternative pricing regimes,
1986-89
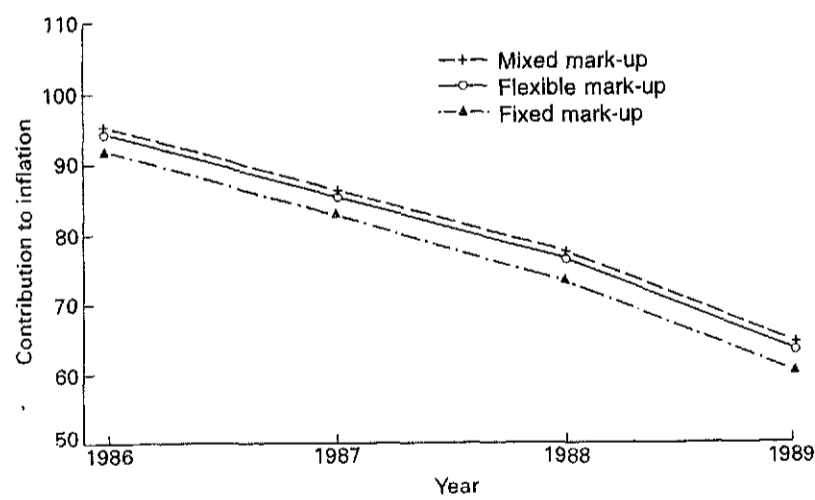
VII Policy implications

Analysis of the simulation results clearly indicates that exchange rate depreciation is likely to be most efficacious in altering the structure of relative prices in Nigeria under the mixed mark-up pricing regime. Under this pricing regime, the inflationary pressure is likely to be less problematic. This pricing regime is characterised by flexible mark-up pricing with rational expectation in all sectors excluding petroleum, utilities, transport and communications. In these sectors, prices are determined on the basis of fixed mark-ups implying that, at best, prices will be affected only by the increase in the cost of imported inputs, on account of exchange rate depreciation. Prices in the remaining sectors will be affected by the actual and anticipated increases in the cost of imported inputs on account of exchange rate depreciation.

It was also found that although exchange rate depreciation under the universal flexible mark-up pricing regime with rational expectation will contribute reasonably to the changes in the structure of sectoral prices, the associated inflationary consequences are the highest. Under this pricing regime, prices in all sectors are determined on the basis of actual and anticipated increases in the cost of imported inputs on account of exchange rate depreciation.

One policy implication of these findings is that wild fluctuations in exchange rates should be avoided, deregulation notwithstanding. Otherwise, the influence of expectations on prices — mark-ups may become sensitive to anticipated exchange rate depreciation — may decimate the desirable effects of changes in the structure of sectoral prices.

Therefore, the government should continue to look for ways of increasing the amount of foreign exchange devoted to servicing the Nigerian economy through the foreign exchange market. In this regard, policies aimed at diversifying the sources of foreign exchange should be carefully articulated and implemented. In particular, the Nigerian Export Promotion Council should identify and promote those manufactured products which will generate positive net foreign exchange if exported.

More importantly, creditors should assist in reducing the debt burden in a fundamental way through debt cancellation and generous debt rescheduling arrangements. The target should be to reduce the debt burden to not more than 10% of export earnings. It is under these conditions that the funding of the foreign

exchange market could increase enough to stabilize the exchange rate, thereby reducing the influence of anticipated exchange rates on producer price determination.

In view of the efficacy of exchange rate depreciation under the mixed mark-up pricing regime in changing the structure of relative prices in the Nigerian context, the present commercialization policy of unfettered freedom to increase prices on account of exchange rate depreciation, should be reviewed. In the short term, at least, the commercialized enterprises, *viz*, the Nigerian National Petroleum Corporation (NNPC), the Nigerian Coal Corporation, the Steel Companies, the National Electric Power Authority (NEPA), the various transport sector enterprises, and the enterprises in the communications sector, should be discouraged from following private enterprise in pursuing replacement cost pricing. Moreover, these enterprises should be encouraged, at least, to maintain the current mark-ups while actively seeking ways of reducing costs through increased efficiency.

Therefore,as a matter of policy, the government should require that before any commercialized enterprise increases its prices, it should show evidence of significant improvement in operational efficiency. It should also be able to demonstrate to the government that the increase in cost due to exchange rate depreciation and/or other credible factors exogenous to the enterprise cannot be completely compensated for through increased efficiency. Finally, the enterprise should be required to show the proportion of the increased cost it can absorb through efficiency gains. Therefore, in the foreseeable future, none of the commercialized enterprises should pass on cost increases in full.

It should be emphasised that although exchange rate depreciation has been found to be most efficacious in altering relative prices in Nigeria under the mixed mark-up pricing regime, its efficacy in altering the structure of output cannot be determined *a priori*. This will depend crucially on the pattern of responses by the maximizing consumers and producers to the constellation of prices. Therefore, the findings so far are insufficient to ascertain the real efficacy of the 'best' or 'preferred' pricing regime in terms of the associated impacts on the structure of output. Further research is needed, therefore, into the issue of the efficacy of exchange rate depreciation in altering the structure of output in the Nigerian economy.

Appendix A

Input-output table for Nigeria, 1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Agriculture	318556	0	0	0	0	0	239724	242750	0	0	0	0	0	0
2. Livestock	0	0	0	0	0	0	24301	2926	0	0	0	0	0	0
3. Forestry	0	0	0	0	0	0	8775	3749	0	3706	0	0	0	0
4. Fishing	0	0	0	0	0	0	0	59	0	0	0	0	0	0
5. Crude petroleum	0	0	0	21327	5891	396	30025	2694	13850	518	126126	232	19161	1149
6. Other mining	0	0	0	0	33	0	14797	3371	0	23479	1434	0	0	0
7. Large scale manufacturing	41875	37898	0	899	1678	0	150897	37874	27	7224	25243	1064	13887	14945
8. Small scale manufacturing	20692	0	0	0	0	0	1132	738	159	0	0	0	0	0
9. Utilities	0	0	0	2135	248	304	26536	141	250	2	718	800	12632	1772
10.Building and construction	0	0	0	0	465	0	0	0	645	0	2318	120	0	0

cont ...

Appendix A continued ...

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
11. Transport	0	0	355	460	19510	19311	79657	1024	916	5333	9449	3667	222935	8447
12. Communications	0	0	0	208	105	0	3912	25	57	272	836	457	3310	2013
13. Wholesale retail trade	9584	6412	0	905	1426	22	120302	2929	544	17029	43041	326	15330	6732
14. Finance and insurance	0	0	0	4762	874	157	17418	228	575	1224	7404	943	0	4940
15. Producers of government services	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Hotels and restaurants	0	0	0	0	298	0	0	0	0	0	973	1355	0	52
17. Real estate and business	0	0	0	5369	3128	2703	2148	37	5356	356	12222	8853	203	5362
18. Housing	0	0	0	448	176	0	3325	127	118	857	494	628	18764	4857
19. Domestic input	390707	44310	355	36513	33833	22894	722950	80198	22497	60000	230259	18447	306222	50269
20. Imported input	8493	0	0	0	30148	0	58616	1325	95	82300	11542	234	0	49
21. Total input	399200	44310	355	36513	63981	22894	781556	81523	22592	142300	241801	18681	306222	50269

cont ...

Appendix A continued ...

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
22. Wages	251200	7600	1200	28800	19620	1706	169257	51522	28374	50700	114822	20929	254470	69778
23. Operating surplus	1647200	473862	132926	391351	157782	39898	289620	32377	5189	102100	156810	4047	616424	121083
24. Depreciation	74500	2700	300	3100	33608	1256	75526	5522	18347	400	89672	4154	47771	78909
25. Value added (fe)	1972900	0	134426	71033	1211010	42860	534403	89421	51910	153200	361310	29130	918665	269770
26. Industrial taxes	0	0	7400	400	2568	0	118128	0	0	100	4280	0	0	0
27. Subsidies	6700	484162	6100	0	0	0	0	0	0	0	20620	300	0	0
28. Value added (M.p)	1966200	484162	135726	71433	1213578	42860	652531	89421	51910	153300	344970	28830	918665	269770
29. Gross input	2365400	528472	136081	107946	1277559	65754	1434097	170944	74502	295600	586771	47511	1224887	320088

	15	16	17	18	Int. Input	Priv. Cons.	Govt. Exp.	Inv.	Export	Import	Fin. Demand	Gross Output
1. Agriculture	0	15191	0	0	597746	1686167	2354	0	105613	26480	1767654	2365400
2. Livestock	0	5307	0	0	32534	488595	667	0	7325	649	495938	528472
3. Forestry	0	0	0	0	16231	113667	98	0	6086	0	119850	136081
4. Fishing	0	5875	0	0	5934	102012	0	0	0	0	102012	107946
5. Crude petroleum	0	0	0	0	221370	129553	1765	3370	951075	29575	1056189	1277559

Appendix A *continued ...*

		15	16	17	18	Int. Input	Priv. Cons.	Govt. Exp.	Inv.	Export	Import	Fin. Demand	Gross Output
6.	Other mining	0	0	0	0	43116	25560	0	0	1645	4566	22638	65754
7.	Large scale manufacturing	0	5249	2786	0	341546	890066	57730	241761	56645	153651	1092551	1434097
8.	Small scale manufacturing	0	0	0	0	22721	146682	883	570	88	0	148223	170944
9.	Utilities	0	1396	1519	0	48425	12564	13486	0	0	0	26050	74502
10.	Building and construction	0	0	0	3387	6936	0	21590	267074	0	0	288664	295600
11.	Transport	0	1416	4385	0	376866	142215	75580	0	27671	35562	209905	586771
12.	Communications	0	734	1480	0	13408	27845	6257	0	0	0	34103	47511
13.	Wholesale retail trade	0	11915	2415	0	238914	980490	5483	0	0	0	985973	1224887
14.	Finance and insurance	0	443	6155	0	45123	276512	363	0	976	2885	274965	320088
15.	Producers of government services	0	0	0	0	0	13901	483550	0	13319	27220	483550	483550

cont ...

Appendix A continued ...

		15	16	17	18	Int. Input	Priv. Cons.	Govt. Exp.	Inv.	Export	Import	Fin. Demand	Gross Output
16.	Hotels and restaurants	0	0	0	0	2679	94217	520	0	0	0	9473	97416
17.	Real estate and business	0	1338	1649	0	48726	206672	57710	0	37900	247655	54627	10335
18.	Housing	0	841	1840	0	32475	164533	6179	0	0	0	170712	203187
19.	Domestic input	0	49706	22228	3387	2094774	5501851	734214	512775	1208343	528243	7428341	9523118
20.	Imported input	0	0	0	0	192803	0	0	0	0	192803	0	0
21.	Total input	0	49706	22228	3387	2287577	5501851	734214	512775	1208343	721046	7236137	9523118
22.	Wages	481344	19656	16092	0	1587070							
23.	Operating surplus	0	26022	62523	199800	5106798							
24.	Depreciation	2206	1742	3225	0	442938							
25.	Value added (fe)	0	47420	81740	199800	7136710							
26.	Industrial taxes	0	290	0	0	133166							
27.	Subsidies	0	0	715	0	34425							
28.	Value added (M.p)	483550	47710	81125	199800	7235541							
29.	Gross input	483550	97416	103353	203187	9523118							

Source: Nigerian Institute of Social and Economic Research (NISER), Ibadan, Nigeria

Appendix B

Actual sectoral price increases in Nigeria 1986-89 (1985 = 100)

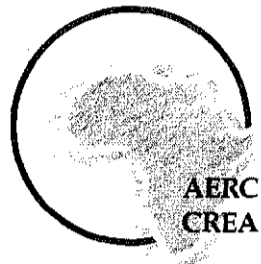|	Sector	1986	1987	1988	1989
1.	Agriculture	88	139	196	217
2.	Livestock	106	117	121	157
3.	Forestry	101	101	116	180
4.	Fishing	117	128	153	148
5.	Crude petroleum	100	287	312	672
6.	Other mining	125	133	136	140
7.	Large scale manufacturing	111	121	159	172
8.	Small scale manufacturing	111	121	159	172
9.	Utilities	127	128	132	133
10.	Building and construction	146	152	156	161
11.	Transport	136	145	154	163
12.	Communication	125	131	139	142
13.	Wholesale and retail trade	103	131	193	202
14.	Finance and insurance	118	128	134	141
15.	Production of government services	100	105	105	
16.	Hotels and restaurants	101	105	106	110
17.	Real estate and bus services	101	111	125	136
18.	Housing	115	116	122	170

Source: Federal Office of Statistics, Lagos

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