

STABILIZATION POLICY IN NIGERIA UNDER ALTERNATIVE EXCHANGE RATE REGIMES: A Postulated Empirical Macro-Model Approach

by

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The study examines the effectiveness of stabilisation policy in Nigeria under alternative exchange rate regimes. A simple version of the Mundell - Fleming model was adopted. The results indicate that the exchange rate regime has implications for the outcome of any stabilisation measure adopted, and further, it is observed that the success of debt management strategies will depend on the exchange rate regime. The study argued that the impact of fiscal policy on the current account balance also depends on the exchange rate regime. We arrived at these conclusions based on certain assumptions such as static expectation and by ignoring price movement. In sum, the study supports the use of a flexible exchange rate regime by an indebted but reforming economy like Nigeria.

1. INTRODUCTION

Perhaps one of the greatest development challenges that has confronted Nigeria in the last decade has been the design and implementation of appropriate policy rules for achieving domestic and external equilibria. At the home front, the nation is faced with the problem of curtailing the phenomenal rise in the general prices level and the growth in labour unemployment rate. Externally, it is faced with the problem of managing its potentially threatening external debt burden, achieving balance of payments equilibrium and encouraging sizable inflow of foreign investible funds.

Since 1986, Nigeria embarked upon a series of stabilization strategies as an integral part of a larger structural adjustment programme (SAP). Prior to the commencement of the SAP, the traditional tools of macroeconomic management were fiscal and monetary policies owing to the controlled regime in the foreign exchange market. The adoption of the SAP led to series of exchange rate measures aimed at ensuring that the perceived over-valuation of the domestic currency is corrected. Since then the country could be described as having undergone regimes of massive liberalization, partial liberalization and what is sometimes called controlled-deregulation. Over time, scholars have argued that the whole exercise

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represents a 'wild goose chase' because all attempts at achieving the desired domestic and external stabilization seems to have failed. Attention now seems to be focused on the effectiveness of stabilization measures under exchange rate regimes embarked upon over the years.

Understanding the design and implementation of stabilisation measures is important for both economic and political reasons. Stabilisation measures have their short to medium term costs which could be enormous to threaten the political process and if such threats are perceived, then the stabilisation process could be reversed or abandoned altogether. This is particularly important in countries experimenting with democratic institutions which tend to lack the power to enforce drastic economic changes. In such cases, the politicians would have to return to the electorates to renew their mandate after a stipulated time interval. The short-run costs of stabilisation and adjustment could jeopardise the chances of the politicians in the next election.

Also, given that stabilisation measures are second-best options, there is no guarantee that the outcomes will be optimal and socially desirable. Economic theory has its results which are largely based on the assumption of an efficient market system. It becomes important to understand to what extent the structure of an economy determines the effectiveness of stabilisation measures, and also the extent to which alternative exchange rate regimes influence the outcomes of stabilisation measures. In economics, the structure of an economy is traditionally described by the relevant parameters of a stipulated model and this approach is followed in this paper.

The basic objective of this paper is to examine how, given the structure of the Nigeria economy, alternative exchange rate regimes affect the ability of macroeconomic policy-makers to influence economic activities through monetary and fiscal policies. In other words, we examine the role of alternative exchange rate regimes in determining the effectiveness of stabilisation policy in Nigeria through an empirical postulated macro-model. This model is then used to examine the twin-deficit syndrome. That is, we examine the extent of relationship between the government's fiscal policy stance and the performance of the economy on current account of the balance of payments.

The rest of this paper is arranged as follows. Section II briefly discusses some theoretical and empirical literature on exchange rate and macro-economic stabilisation. Section III discusses the structure of the model, while section IV presents the empirical results. Section V discusses our results vis-a-vis the theory and section VI presents the conclusion.

II. SOME THEORETICAL AND EMPIRICAL ISSUES ON EXCHANGE RATE

Open economy macroeconomics in the last three decades have been dominated by the issue of how to achieve full employment without inflation (internal balance) along with equilibrium in the balance of payments (external balance). The fundamental questions here include: When is it appropriate to vary the exchange rate? What appropriate monetary-fiscal policy mix will be required for the simultaneous achievement of external and internal balances?

To a large extent, modern approaches of analysis have followed the Mundell (1963) and Fleming (1962) expositions, although earlier writers such as Lerner (1944) and Robinson (1947) have adopted the elasticity approach. Harberger (1950) and Alexander (1952) have also specifically examined the impact of devaluation on the trade balance. In general, the thrust of the literature has been a systematic analysis of the role played by international capital mobility in determining the effectiveness of macro-economic policies under alternative exchange rate regimes, (See Barro and Fischer, 1976; Marston, 1985; Blanchard 1988; and Fisher, 1988). Though the emphasis have been different over time, the essence of the argument still remains the analysis of open economy stabilisation policy.

The novelty of the Mundell (1963) and Fleming (1962) models lies in not only systematically evaluating the role of international capital mobility in determining the effectiveness of macro-economic policies under alternative exchange rate regimes, but in extending the Keynesian income-expenditure framework developed by Machlup (1943) and Metzler (1942), as well as the policy-oriented model developed by Meade (1951), to include economies open to international trade in both goods and financial assets. Over time, the model has taken different directions and is still the core of traditional open-economy macroeconomics. Such directions (taken over time) include the stock (portfolio) specifications of capital mobility by Mckinnon (1969), Branson (1970), Floyd (1969), and Frenkel and Rodriquez (1975); analyses of debt-revaluation effects to exchange rate changes by Boyer (1977) and Rodriquez (1979); and long-run framework by Rodriquez (1979); and analysis of expectations and exchange rate dynamics by Kouri (1976) and Dornbusch (1976). Dervis (1985) provided critical evaluation of the model.

Using the model for the analysis of alternative exchange rate regimes and for different degrees of international capital mobility had been undertaken by Swoboda and Dornbusch (1973) and Musa (1979). A survey of various open economy macro-economic issues is also contained in Frenkel and Mussa (1985) and Kenen (1985). A survey of application is contained in Martson (1985), while Obstfeld and Stockman (1985) have provided a survey of exchange rate dynamics in this and related models.

A comprehensive treatment of Mundell-Fleming model is given in Dornbusch (1980).

Blanchard (1988) addresses the monetary aspect, while Fischer (1988) ignores open economy issues. Basically, the disappointment following the system of floating exchange rate adopted in many western economies in the 1970s brought about a renewed attention to the subject. As Purris (1985) argues, the result of this has been that the large swings which have occurred in exchange rates have often become the source of need for domestic policy adjustment rather than serving as an expedient mechanism for facilitating adjustment of the economy to various disturbances. It is this development that prompted renewed investigation of a number of issues in open economy macroeconomics.

Frenkel and Razin (1987) provide an exposition of the Mundell-Fleming model that integrates various aspects into a single framework. Such aspects include the distinction between short-run and long-run consequences of policies, the implications of debt and tax financing of the public budget and the role of exchange rate. Kearney (1990) made a survey of both 'postulated' macro models and optimising macro models used in analysing open economy stabilization policy. Generally, the results of postulated macro-model have been that under a fixed exchange rate regime, fiscal policy increases output and reduces trade balance, while under a flexible exchange rate regime, fiscal policy has no effect on output, but it appreciates the exchange rate and causes a decline in trade balance. On the other hand, under fixed exchange rate, monetary policy has no effect on output, exchange rate and the trade balance, while under a flexible exchange rate regime, monetary policy increases output, depreciates the exchange rate and causes a decline in trade balance. These results are conditional on the assumption made with respect to capital mobility.

III. THE MODEL

A simple version of the Mundel-Fleming Model is adopted for this study. The structure of the model is presented below.

Expenditures and Public Revenue

$$C = c(Y, W) \quad c'_Y > 0, c'_W > 0 \quad \dots\dots\dots(1)$$

$$I = I(Y, r) \quad i_Y > 0, i_r < 0 \quad \dots\dots\dots(2)$$

$$G = \bar{G} \quad \dots\dots\dots(3)$$

$$T = t(Y) \quad t_Y > 0 \quad \dots\dots\dots(4)$$

Balance of Payments

$$X = x(S, p/p^*) \quad x'_S > 0 \quad \dots\dots\dots(5)$$

$$M = m(S, p/p^*, Y, R) \quad M'_S > 0, M'_Y > 0, M'_R > 0 \quad \dots\dots\dots(6)$$

$$CA = (X-M) - rD \quad \dots\dots\dots(7)$$

$$K = R(S^p/p^*), (r-1^*+DS^e, W) K_{,g} < 0, K_{,r} < 0, K_{,w} > 0 \quad \dots\dots\dots(8)$$

$$BP = CA + K \quad \dots\dots\dots(9)$$

$$\Delta D = rD - (X-M) - (K-\Delta R) \quad \dots\dots\dots(10)$$

Money

$$M^d L = l(Y, r, W). PL_{,y} < 0, L_{,w} > 0 \quad \dots\dots\dots(11)$$

$$M^s = \bar{H} + R \quad \dots\dots\dots(12)$$

$$B = b(Y, W, Y, r^*+BS^e). Pb_{,y} > 0, b_{,r}^* < 0, b_{,r} > 0, b_{,w} > 0 \quad \dots\dots\dots(13)$$

Identities

$$Y = C + I + G + X - M \quad \dots\dots\dots(14)$$

$$DD = DR - BP \quad \dots\dots\dots(15)$$

$$M^s = M^d \quad \dots\dots\dots(16)$$

$$W = L + B + K \quad \dots\dots\dots(17)$$

$$G-T = \Delta \bar{H} + \Delta B - \Delta R \quad \dots\dots\dots(18)$$

$$M-X = \Delta K + \Delta D - \Delta R \quad \dots\dots\dots(19)$$

Where:

C = Private Domestic Consumption

I = Domestic Investment

Y = Gross Domestic Output

X = Exports

M = Imports

T = Taxes

r = Domestic real rate of interest

$r^* + \Delta S^e$ = Foreign interest rate adjusted for expected exchange rate depreciation

S^p/p^* = Real Spot exchange rate

S = Domestic currency price of foreign exchange

M^d = Money demand

B = Bonds

H = High powered money

CA = Current Accounts

K = Capital Accounts

D = Foreign debt in domestic currency term

R = Reserve of foreign exchange

W = Stock of Wealth

P = Domestic Price level

G = Government expenditure

A 'bar' means the variable is determined by the relevant authority
 '**' signifies a foreign variable.

For simplicity, we assume that Nigeria is small country and as such could not influence foreign variables such as foreign rate of interest, r^* . Furthermore, we set all prices and wages to unity so that all variables are defined in real terms. This is in line with the original Mundell - Fleming formulation. We also assume that expectations are formed in a static manner so that $S^e = 0$. By imposing Walras law we can make

domestic bonds to be the residual in private portfolio, and so it will drop out of the analysis.

Equations (14) to (19) define the national income identity, debt accumulation process, money market equilibrium, wealth identity, government budget constraint and the external sector balance which allows for reserve variation and non-consolidation of the capital accounts. By substituting (1) to (13) into equations (14) to (19) and differentiating totally, we arrive at the following linear equations:

$$(c'_y - c_i t'_y + i_y - m_y) dy + i_r dr + C_w dw + dG + (X'_s - m'_s) ds - M'_R dR \dots (20)$$

$$dD = (i + m'_R) dR - (X'_s - m'_s + R'_s) ds + M'_y sY + (D - k'_r) + dr - k'_w + rdD \dots (21)$$

$$dH + dR = C'_y dY + Cr dr + C_w dw \dots (22)$$

$$dW = L_y dY + (L_r + T_r) dr + (C_w + R'_w) dw + R_s ds \dots (23)$$

$$dR = dH + t_y dY - dG \dots (24)$$

$$dk = R_s ds + (K_r - D) dr + R_w dw - rdD \dots (25)$$

Under a fixed exchange rate regime ($ds = 0$), equations (20)-(25) solve for six variables, Y , r , W , R , D and K . While under a flexible exchange rate ($dr = 0$), the system solves for Y , r , W , S , D and K . The extent of foreign capital mobility is captured by R_s , R_r , and R_w . For this study, X'_s represented the marginal response of non-oil exports to Naira adjustment vis-a-vis the American dollars. For all the behavioural equations in (1) to (19), a linear relationship is postulated and the parameters estimated by least square. The levels of G and H represent exogenous or policy variables. The systems of equations (20) - (25) determine the short-run equilibrium values of the endogenous variables. It should be noted that equation (18) allows for financing deficit through money creation or reserved variation. This formulation means we cannot focus on the 'pure' effects of fiscal policy.

expansion is bond (or debt) financed when $dT = 0$.

Equations (20) - (28) are linear in both variables and parameters and these are solved by simple matrix inversion. It should be noted that some of parameters derived from the least square estimation of the equations were insignificant and some had wrong signs. However, we believe that such parameters capture the data adequately based on goodness of fit tests conducted.

IV. ANALYSIS AND DISCUSSION OF RESULTS

First, under a fixed exchange rate regime, three different scenarios were evaluated (See Table 1). The first being a zero per cent interest rate and zero level of external debt, followed by a 1 per cent interest rate and a unit level of external debt, then a 10 per cent level of interest rate with a unit level of external debt. A base run solution where $dG = dH = 0$ naturally gives a trivial solution which acts as our benchmark. A unit increase in public sector expenditure ($dG=1$) was observed to increase real output by 3.56 units (See Table 1), interest rate rose by 0.0021 units, while wealth balance and external reserve declined by 0.25 and 0.29 units respectively. Since public sector expenditure (when $dT=0$) will be financed by money creation ($dH>0$) or and reserve variation, given the stock of bonds, if $dH=0$, then reserve will fall to finance such deficit which will decrease money supply. The capital accounts rose by 0.04 units mainly owing to the rise in interest rate, while external debt rose by 0.72 unit because of the deficit in the current accounts.

When high-powered money was increased by 1 unit ($dH=1$), without any change in public expenditure, real output declined by 8.57 unit (See Table 2), interest rate fell by 0.0006 units, while wealth balance increased by 0.72 unit. External reserve, external debt and the capital accounts decreased by 0.11, 1.56 and 0.17 units respectively. The current account surplus and increase in reserve led to the fall in external debt.

A simultaneous unit increase in public expenditure and money supply decreased output, interest rate, external reserve, external debt and the capital account. However, wealth effect was positive.

Allowing for interest rate of 1 percent and a unit level of external indebtedness, we observed that fiscal expansion produced the same result with marginal increases in external debt and the capital account. That is a positive level of interest rate and external debt produced similar result, the difference being in the changes in external debt and the capital account. The change in external debt was more than when interest rate and debt were set at zero, while the reduction in the capital account was less. The level of initial interest rate was raised to 10 per cent and we observed that the impact was also on the levels of external debt and the capital account.

For a flexible exchange rate regime, we observed that fiscal expansion increased real output by 5 units (when interest rate and existing level of debt are set at zero). Real interest rate reduced and so were all other modelled variables. A unit increase in high powered money reduced output by 5 units. All other variables declined also. A simultaneous unit increase in public expenditure and money supply left output unchanged. All other modelled variable, however, declined. A positive level of interest rate (1 percent) and unit level of external debt produced similar results with marginal differences in the changes in external debt and capital account balance. Increasing the level of existing interest rate to 10 per cent impacted on the changes in external debt and capital account. However, in all cases the exchange rate fell, that is the domestic currency appreciated in value. The larger impact on exchange rate came from a simultaneous unit increase in public expenditure and money supply.

From the above results, certain tentative findings emerged. First, we observed that under a flexible exchange rate system, fiscal policy will increase real income, while monetary policy will contract it, both with the same absolute value. A simultaneous fiscal and monetary expansion leaves output unchanged. Second, under a flexible exchange rate regime, fiscal and monetary policy tend to reduce real interest rate with a larger effect owing to monetary policy. Third, the above findings tend to be largely invariant to the level of existing interest rate and external debt. Also, external debt varied more owing to fiscal than monetary expansion.

However, under a fixed exchange rate regime, fiscal policy is less expansionary and monetary policy more contractionary than under a flexible exchange rate regime; the net effect of a simultaneous fiscal and monetary expansion being a decline in real output. Also, fiscal policy increases real interest rate, while monetary policy reduces it with a net effect that results in reduced interest rate. Thus, in controlling real interest rate, monetary policy tends to be more effective. Under a fixed exchange rate system, wealth balance responds more to monetary expansion. Also, under a fixed exchange rate system, monetary policy tends to be a more effective debt management tool as fiscal expansion increases external debt, while monetary policy reduces it, resulting in a negative net effect. When exchange rate is fixed, fiscal policy tends to increase capital account balances, however, this conclusion is reversed as real interest rate rises; the net effect being a decline in capital account balance.

Under a flexible exchange rate system, fiscal policy affects the exchange rate more than monetary policy. Both tend to always reduce the exchange rate, i.e. both could lead to domestic currency appreciation. In sum, under flexible and fixed exchange rate regimes, output, interest rate, wealth balance, exchange rate and external reserve tend to be largely invariant to the existing levels of real interest rate and external debt, while the level of debt and capital account are sensitive to the existing levels of real interest rate and external debt. Real output tends to be

unchanged when fiscal and monetary policies are combined under a flexible exchange rate, while it tends to decline under a fixed exchange rate system.

IV.1 Theory and The Facts

From the analysis of the last section, we observed that in certain respects, our empirical model confirms the theoretical expectations, while in others it contradicts it. These are explained below.

We observed, in accordance with theory, that monetary policy is not neutral in the short-run and, in fact, impacted more on output than fiscal policy under a fixed exchange rate regime. Its impact observed to be contractionary with respect to output; this is contrary to theoretical expectation. It was also observed that exchange rate may likely not be largely a monetary phenomenon. Fiscal expansion impacts more on exchange rate than monetary policy. This result may have to be interpreted with caution since the parameters of the model tend to reflect the Nigerian situation.

Finally, it was noted that interest rate responds more to monetary policy than to fiscal policy.

IV.2 Fiscal Policy and The Current Account Balance.

On the issue of the twin deficit, under a flexible exchange rate system, both fiscal and monetary policies resulted in surplus in the current account, with fiscal policy having the larger impact. However, under a fixed exchange rate regime, fiscal expansion, by increasing public expenditure (through debt), resulted in current deficit, while monetary policy caused a surplus, with a positive net effect. It was, thus, observed that the ability of fiscal measures to lead to a current account deficit will depend, to a large extent, on the type of exchange rate regime. However, monetary policy was observed not to result in current account deficit under both exchange rate regimes.

V. TENTATIVE POLICY ISSUES

From the discussion above, some policy issues and recommendation are highlighted below. First, it is obvious that for any economy, both fiscal and monetary policies are required, but their effects differ under different exchange rate regimes. Our results tend to favour the use of a flexible exchange rate regime in macroeconomic management in Nigeria. The reasons are highlighted as follows. First, monetary and fiscal policies do tend to lead to current account deficit; second, fiscal policy expanded output more, while monetary policy contracted output less,

when compared to a regime of fixed exchange rate. The effect of policy (especially fiscal policy) on external debt is more under a flexible exchange rate regime.

That Nigeria is a severely-indebted low-income country is no news. Debt management is a topical macroeconomic issue. The management of external debt tends to be more effective under a flexible exchange rate. Also, expansionary fiscal and monetary policies do not seem to have the tendency to raise real interest rate as fiscal policy does under a fixed exchange rate regime.

Also, under the suggested flexible exchange rate regime, we favour the use of fiscal policy more in the control of macroeconomic aggregates. This does not suggest that we do not favour the use of monetary policy, but rather, monetary policy under a flexible exchange rate system will strengthen fiscal measures in certain respects, especially in the control of interest rate, current account and debt reduction. There is, however, the tendency for it to reduce output. But such reduction is less (in absolute term) than the reduction arising from monetary expansion under a fixed exchange rate regime.

VI CONCLUSION

The effectiveness of any stabilisation policy will depend largely on the structure of the economy or the country in question. The structure of an economy is typically captured by the relevant parameters of a stipulated model. The observations presented above are constrained by certain limitations. For instance, the inter-temporal restrictions on public sector budget is not taken into consideration. This is usually taken care of by forward looking inter-temporal optimisation models. Also our assumption about expectation and foreign variable could limit the general validity of the results. However, it should be observed that a depressed economy is unlikely to have a structure similar to those obtained in advanced industrialised economies. In that case, the effectiveness of any policy rule will have to take into consideration the structure and features of such an economy. Such features may make the results derivable from theory unrealistic. Thus, it is clear that stabilisation policies have different effects under alternative exchange rate regimes. The ability of fiscal expansion to lead to current account deficit will also depend on the exchange rate regime. The adoption of any stabilisation measures by depressed developing countries may need to be examined against the structure and features of that particular economy, and given the features of that economy, it must design an appropriate exchange rate system if desired results are to be achieved.

TABLE 1. SHORT-RUN MULTIPLIER OF A UNIT RISE IN GOVERNMENT SPENDING UNDER FIXED AND FLEXIBLE EXCHANGE RATES.

MULTIPLIERS			
AFFECTED VARIABLES	DEBT FINANCED RISE		
	FIXED EXCHANGE RATE		
	r = 0%: D = 0	r = 1%: D = 1	r = 10%: D = 1
Real Output	3.56	3.56	3.56
Real Interest	0.0002	0.0002	0.0002
Real Wealth	-0.25	-0.25	-0.25
External Reserves	-0.29	-0.29	-0.29
External Debt	0.72	0.72	0.80
Capital Accounts	0.04	0.03	0.03
Current Accounts	-1.04	-1.05	-0.14
FLEXIBLE EXCHANGE RATE			
Real Output	5	5	5
Real Interest	-0.0001	-0.0001	-0.0001
Real Wealth	-1.37	-1.37	-1.37
External Reserves	-0.0004	-0.0004	-0.0009
External Debt	-4.22	4.26	-4.69
Capital Accounts	-1.37	-1.33	-0.90
Current Accounts	5.59	5.58	5.49

TABLE 2. SHORT-RUN MULTIPLIER OF A UNIT RISE IN MONEY SUPPLY UNDER FIXED AND FLEXIBLE EXCHANGE RATES.

MULTIPLIERS			
AFFECTED VARIABLES	DEBT FINANCED RISE		
	FIXED EXCHANGE RATE		
	r = 0%: D = 0	r = 1%: B = 1	r = 10%: D = 1
Real Output	-5.57	-5.57	-5.57
Real Interest	-0.0006	-0.0006	-0.0006
Real Wealth	0.72	0.72	0.72
External Reserves	-0.11	-0.11	-0.11
External Debt	-1.56	-1.58	-1.74
Capital Accounts	-0.17	-0.15	0.0064
Current Accounts	-1.62	1.61	1.52
FLEXIBLE EXCHANGE RATE			
Real Output	-5	-5	-5
Real Interest	-0.0008	-0.0008	-0.0008
Real Wealth	0.28	0.28	0.28
External Reserves	-0.0002	-0.0002	-0.0002
External Debt	-0.79	-0.79	-0.87
Capital Accounts	-0.72	-0.71	-0.63
Current Accounts	1.50	1.49	1.4

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