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MONETARY POLICY AND MACROECONOMIC MANAGEMENT: A SIMULATION EXPERIMENT

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ABSTRACT

The dynamic nexus between money supply, fiscal deficit, inflation, output and exchange rate management has generated much debate in economic literature in Nigeria in recent times. To contribute to this debate, this paper uses 3SLS estimation technique as well as carried out policy simulation experiment to investigate how monetary variables interact with aggregate supply, demand and prices in order to aid stabilization policies. The results show that monetary variables and government finance is linked through the government's net indebtedness to the banking system. The simulation results show that a 20 percent monetary squeeze would reduce inflation rate faster than if the reduction in money supply were 10 percent. This reduction in money supply also leads to a reduction in output, employment and government and government expenditure, which may hurt the domestic economy. Thus, the study concludes that there is a trade off between higher GDP growth and inflation in Nigeria.

KEYWORDS: Monetary policy, fiscal policy, macroeconomic management and simulation experiment.

INTRODUCTION

The poverty of knowledge on the precise quantitative relation among variables in the monetary sector and fiscal sector by policy-makers have, often been explained as the major cause of distortions in key macroeconomic aggregates. In Nigeria, the interaction of the monetary sector and the fiscal sector is of great importance. This is because a substantial part of the fiscal deficit is financed by the Central Bank of Nigeria (CBN) credit to government and as observed by Tobin (1999) monetary and fiscal policies are distinct only in financially developed countries, where the government does not have to cover budget deficits by printing money or fiduciary issues from CBN. In such advanced economies, the government can sell obligations to pay money in future, like the U.S. Treasury bills, notes , and bonds. However, in Nigeria the story is different because over the years, the growth rate of money (M2) is closely linked to the monetization of budget deficit, which makes the growth rate of M2 very volatile. For instance, from a growth rate of 8 per cent in 1971, it improved to 15.81 per cent in 1975. By 1980, it was 32.98 per cent; dropped to 23.42 per cent in 1990 improved marginally to 48.1 per cent in 2000 and was brought down to 24.1 per cent in 2003. In 2004, it dropped to 14 per cent. The gross domestic product (GDP) growth rate, which was 21.35 per cent in 1971, fell to -2.96 in 1975, while inflation rate increased remarkably from 15.8 per cent in 1971 to 33.9 per cent in 1975. The balance of payments, exchange rate remained relatively stable from 1970 to 1975. However, beginning 1979, the economy began to show signs of depression. By 1983, the economy was well into depression. Between 1980 and 1988, gross domestic product grew at a negative rate, inflation rate and unemployment rate became very high. Disequilibrium in the balance of payments exacerbated the external debt crisis.

The recession, which had afflicted the Nigerian economy since mid 1981, continued through 1983. GDP, which fell by 0.34 per cent in 1982 decline further by -5.37 per cent in 1983, recorded a moderate increase of 3.13 per cent in 1986. The broad money supply follows a similar pattern, as seen in Table 1.1. From 1992 to 2002, the economy passed through another series of serious macroeconomic instability characterized by large deviations of financial aggregates from policy targets. For instance, in 2002 policy target a GDP growth rate of 5 per cent but actual was 3.5 percent. In the same year, the target for M2 was 15.3 per cent and at the end of the year, the actual

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was 26 per cent. The inflation rate follows a similar pattern deviating from a policy target of 9.3 per cent to 12.9 per cent. Bearing a few exceptions, this has been the trend in other key macroeconomic aggregates. The economy also witnessed increased pressures in the domestic and external sectors of the economy and marginal decline in the performance of the real sector. However, the performance of the economy improved substantially in 2003. This is because available statistics from National Bureau of Statistics (NBS) shows that GDP increased by 10.2 per cent, compared to 3.5 per cent in 2002. Inflationary pressure persisted; as it rose to 14 per cent in 2003 from 3.5 per cent in 2002 (CBN annual report and statement of account various issues). The major source of macroeconomic instability is, often attributed to the increasing magnitude of money supply, which exert pressure on the exchange rate and domestic demand and hence price.

This observed instability in key macroeconomic variables question whether policy-makers understand precisely the quantitative relationship between variables in the monetary sector and the real sector, and how monetary stimulus affects various sub-sectors of the economy.

TABLE 1.1 : Some selected macroeconomic indicators, 1970-2004

OBSERVATION	Real GDP GROWTH RATE (%)	Money Supply(M2) GROWTH RATE (%)	BALANCE OF PAYMENTS	INFLATION	EXCHANGE RATE	OVERALL FISCAL BALANCE	FISCAL BALANCE AS % OF GDP
1970			46.2	13.8	0.7143	-455.1	-8.7
1971	21.3	8	117.4	15.6	0.6955	171.6	2.6
1972	5.48	11.96	57.2	3.2	0.6579	-58.8	-0.8
1973	6.42	7.93	1927.5	5.4	0.6579	166.1	1.5
1974	11.74	67.08	3102.2	13.4	0.6299	1796.4	9.8
1975	-2.96	15.81	157	33.9	0.6159	-427.9	-2
1976	11.08	14.39	-339	21.2	0.6265	-1090.8	-4
1977	8.15	16.29	-527.2	15.4	0.6466	-781.4	-2.4
1978	-7.37	15.92	1293.6	16.6	0.606	-2821.9	-7.8
1979	2.44	17.35	1860.9	11.8	0.5957	1461.7	3.4
1980	5.48	32.98	2402.2	9.9	0.5464	-1975.2	3.9
1981	-26.8	12.51	-3020.8	20.9	0.61	-3902.1	-7.7
1982	0.34	1.79	-1308.3	7.7	0.6729	-6104.1	-11.8
1983	-5.37	7.48	-301.3	23.2	0.7241	-3364.5	-5.6
1984	-5.09	20.06	354.9	39.6	0.7649	-2660.4	-4.2
1985	9.38	3.32	349.1	5.5	0.8938	-3039.7	-4.2
1986	3.13	3.27	-784.3	5.4	2.02575	-8254.3	-11.3
1987	0.47	11.13	159.2	10.2	4.017942	-5889.7	-5.4
1988	9.91	14.84	-2294.1	38.2	4.536733	-12160.9	-8.4
1989	7.39	24.96	8727.8	40.9	7.391558	-15135	-6.7
1990	8.2	23.42	18490.2	7.5	8.037808	-22116	-8.5
1991	4.73	21.73	5659.6	13	9.909492	-35755	-11
1992	2.98	11.49	-85271	44.5	17.29843	-39533	-7.2
1993	2.65	97.1	13615	57.2	22.05106	-107735	-15.5
1994	1.31	13.47	-42623.3	57	21.8861	-70271	-7.7
1995	2.15	30.9	-195216	72.8	84.575	1000	0.1
1996	3.39	10.26	-53152	29.3	79.6	32049	1.6
1997	3.16	8.07	1077.7	8.5	74.625	-5000	-0.2
1998	2.31	11.73	-224676	10	84.3679	-133389	-4.7

1999	3.05	18	-326634	6.6	96.1	-285105	-8.4
2000	3.8	48.1	-314128	6.9	101.7	103777	-2.7
2001	3.91	27	24728.8	18.9	111.901	221049	-4
2002	3.5	21.6	-565353.3	13.2	120.9521	547000	-5.5
2003	10.2	24.1	162839.66	14	129.3612	662000	-2.8
2004	6.1	14.0	1128383.4	10.0	133.5	672500	13.7

Note: Balance of Payments and Overall Fiscal Balance is in (# million), the exchange rate is average rates, expressed in Naira per unit of the US Dollar.
SOURCE: CBN Statistical Bulletin (2002 and 2004 issues)

The major objective of this paper is to investigate how monetary variables affect various sub-sectors of the Nigerian economy using a macroeconomic model. The specific objectives include investigating the response of key endogenous variables to policy shocks and articulate policies to promote economic growth with monetary stability.

The significant of this study is to assist policy-makers to gain useful insights into how monetary policy variables affect the various sub-sectors of the Nigerian economy. Such understanding, in our opinion, will help the Central Bank of Nigeria to formulate and implement useful monetary policy from a set of economic choices and a better appreciation of the inter-connections within the economy. This paper is an extension of Ikhide (1998), which simulated only the financial sector of the Nigerian economy ignoring sectors such as the real sector, external sector etc. Ignoring these other sectors means policy analysis could not be undertaken. This is because model of the financial sector does not lend itself to much policy analysis unless it is combined with other sectors where policy analysis could be performed on major macroeconomic variables like GDP, investment, money supply, consumption etc. The gap, this study intends to fill.

In formulating the theoretical appeal of this work, we follow an eclectic approach. In other words, we derive theoretical ideas from different theoretical paradigms. However, the main theoretical ideas that motivate this work come from the supply and demand side arguments of the monetarist, classical, neoclassical and Keynesian schools.

Following the introduction, the rest of the paper is organized into four sections. Section two, discourses the methodological framework of the study. Section three presents the summary of major findings. In section four we discourse some useful recommendations of the study and the paper concludes in section five with some concluding remarks.

1.1 Methodological Framework

1.1.1 The Model

The macro-econometric model (MEM) proposed in this study is ideal because it provides information on the dynamics of the adjustment process, which is useful for short-term and medium-term forecasting and policy analysis. It is also structural in the sense that it allows the formal use of econometrics as the best tool for policy analysis at the macro-level. It stresses the crucial role monetary variables play in the behaviour of key macroeconomic aggregates such inflation, output and balance of payments. Thus, the analysis can be considered a generalizational of the models developed in the context of the monetary approach to balance of payments. Albeit, monetary factors are assigned a dominant role, the study assumes that within the Nigerian context money supply is not necessarily under the close control of the Central Bank of Nigeria; capital market is not well developed, and therefore the growth rate of credit may be closely linked to the government borrowing requirements and hence to its fiscal policy. In this model, monetary (cum fiscal) policy is the relevant means by which policy-makers seek to achieve their objectives, and it is the domestic component of the money stock that is the instrument to be used to this end. The macroeconomic model used in this study is a medium-sized. This is because the number of equations exceeds 20 but less than 100 (Iyoha, 1996). The model has 32 equations of which 20 equations are stochastic relationship and 12 are identities. The model discussed below is adapted from a well-known equation system, tractable and relevant; benefits greatly from the works of Ojo (1973), Ajayi (1978), Khan and Knight (1981), Soludo (1998), Olofin (1985) and Ikhidi (1998).

The model is broadly classified into six blocks – the monetary block, fiscal block, the production block, aggregate demand block, the labour market block and the external sector block. This classification is important on two counts. First, it allows us capture the crucial role monetary

variables play in the behaviour of macroeconomic aggregates such as inflation, output and balance of payments as well as the transmission mechanism of monetary policy in terms of financial market quantities and prices.

In the monetary block we specify equations that show the demand and supply of money and an inflation equation. On the demand side, we disaggregate into the demand for currency, demand for demand deposit, savings deposits and time deposit. Money supply is the sum of monetary base and the fiscal deficit. We close monetary block with an identity showing equilibrium in the money market.

Output in the production block is split into oil and non-oil. The non-oil sector is disaggregated into agriculture and manufacturing. Output of the agriculture sector is aggregative and relates to credit to the agricultural sector, technology and labour employed in the agricultural sector. Manufacturing output is assumed to be represented by Cobb-Douglas type, determined by credit to manufacturing sector, price, exchange rate, technology and labour employed in the manufacturing sector. Oil output and price per barrel of crude is exogenously determined. In the fiscal block, we specify two equations. The government revenue and expenditure equations are specified and the block is closed with an identity.

The aggregate demand block includes equations for consumption and investment demand. In the labour market block, equations for the demand for and supply of labour, unemployment are specified and the block is closed with an identity showing equilibrium in the labour market.

In the external block, we specify the exchange rate equation, import and export equations. The import equations are disaggregated into capital and consumer goods imports and exports are also disaggregated into agricultural and manufacturing exports.

Summary of Equations:

The Monetary block

$M^d = dCu + dDD + dSd + dTd$ - - - - (1)

$dCu = X_0 + X_1LGDP + X_2R + X_3INFLA + X_4dCu_{-1} + Ut$ - (2)

$X_2 < 0, X_1, X_3, X_4 > 0$

$dDD = X_0+X_1GDP+X_2INFLA+X_3R+X_4dDD_{-1}+ Ut$- - (3)

$X_2< 0; X_1, X_3, X_4 > 0$

$dSd = X_0+X_1R+X_2GDP+X_3INFLA+X_4dSd_{-1}+Ut$ - - (4)

$X_1<0, X_2, X3, X4 \geq 0$

$dTD = X_0+X_1GDP+X_2INFLA+X_3R+X_4dTD_{-1}+Ut$ - - (5)

$X_2X_3<0; X_1X_4>0$

Money Supply:

$Ms = Mb + DC$ - - - - - (6)

Where

Ms = broad money supply

MB = Monetary base (currency in the hand of the non bank public, cash reserve of the commercial banks, and treasury bills in the hands of the banking sector and the public, (Ajayi, 1998).

DC = domestic credit

$Mb = X_0+X_1FDEF+X_2M2 + Ut$ - - - (7)

$X_1X_2>0$

$INFLA = X_0+X_1MS+X_2Exchr+X_3GDP+X_4OPEN+X_5INFLA_{t-1}+Ut$- (8)

$X_3X_5<0; X_1X_2X_4 \geq 0$

$Ms = Md$ - - - - - - - (9)

Government Block:

$FDEF = GEXP – GREV$ - - - - - (10)

$LGEXP=X_0+X_1LGDP+X_2LPoP+X_3CREGOV+X_4LGEXP_{-1}+Ut$ - (11)

$X_1X_2X_3X_4 \geq 0$

$LGREV = X_0+X_1GDP+X_2Exchr +LGREV_{-1} + Ut$ - - - (12)

$X_1\ X_2\ X_3 \geq 0$

Aggregate Demand:

$AD = C+I$ - - - - - - - (13)

$Con = X_0+X_1Yd+X_2R+X_3Con_{-1}+Ut$ - -- - (14)

$X_1\ X_3 > 0; X_2 \leq 0$

$GDI = X_0+X_1GDP+ X_2R+X_3INFLA+X_4GDI_{-1}+Ut$ --- - (15)
$X_1X_3X_4 \geq 0$ $X_2 \leq 0$
Production Block:
$X = Xag+Xmn + OilX$ - - - - (16)
$Xag = X_0 + X_1CRAg + X_2R + X_3Tech + X_4PoPA + Ut$ ---------- (17)
$X_1X_2X_3X_4>0$
$Xmn = X_0 + X_1CredMn + X_2Tech + X_3PoPm + X_4R + Ut$ ---------- (18)
$X_1X_2X_3X_4 \geq 0$
oilX = F(Joint Cash Call) - - - - - (19)
XoT = X(Xag + Xmn + OilX) - - - - - (20)
Labour Market:
$Ld = Xo + X_1GDP + X_1W/p$ - - - - - (21)
$X_1\ X_2 \geq 0$
$Ls = Xo + X_1GDP + X_2\ w/p$ - - - - (22)
$X_1\ X_2 \geq \underline{0}$
$UNEM = Xo + X_1GDP + X_2\ INFLA + X_3w/p$ - - - (23)
Ld = Ls - - - - - - - (24)

The External Sector:
BOP = X-M - - - - - - - (25)
$X = X_a+X_b$ - - - - - - - (26)
$LXa = X_0+ X_1LCRAg +LExchr+ X_3Ly + X_4PoPA +Ut$ - - (27)
$X_1X_2X_3X_4 \geq 0$
$Xb = X_0 + X_1XREMA + X_2Exchr + X_3Yt + PoPM + Ut$ - - (28)
$X_1X_2X_3X_4 > 0$
$M_a = X_0+X_1M_2+X_2ExchrX_2+ R+Ut$ - - - - (29)
$X_1X_3 \geq 0; X_2 \leq 0$
$M_b = X_0+X_1GDP + X_2Exchr+Ut$ - - - - - (30)
$X_1>0: X_2 \leq 0$
$EXCHR = X_0+X_1LM_2 + X_2GDP + Ut$ - - - - (31)
$BOP = X_a+X_b – (M_a+M_b)$ - - - - - - (32)

TABLE 3.1: Definition of variables

Code	Description of Variables	Variable Type
dCU	Currency outside banks	Predetermine
dDD	Demand deposit	Predetermine
dSD	Demand saving deposit	Predetermine
dTD	Demand time deposit	Predetermine
Infla	inflation	Predetermine
Gexp	Government expenditure	Predetermine
Grev	Government revenue	Predetermine
Con	consumption	Predetermine
GDI	Gross domestic investment	Predetermine
Mb	Monetary base	Predetermine
Xag	Agricultural output	Endogenous
Xmn	Manufacturing output	Exogenous
Ld	Labour demand	Endogenous
Ls	Labour supply	Endogenous
Unem	Unemployment	Endogenous
Xa	Agricultural export	Endogenous
Lma	Capital goods import	Endogenous
Lmb	Consumer goods import	Exogenous
Ms	money supply	Exogenous
Cremn	Credit to manufacturing sector	Exogenous

Creag	Credit to agric. sector	Exogenous
Exchr	Exchange rate	Exogenous
GDP	Gross domestic product	Exogenous
POP	population	Exogenous
Cregov	Credit to government	Exogenous
Tech	Technology	Exogenous

11.2 Estimation Technique

A cursory perusal of the equations of the model indicates that all the equations are over identified; there are feedback effects. Thus, OLS cannot capture this feedback. The available and appropriate estimation technique include Two Stage Least Squares (2SLS), Maximum Likelihood Method (ML), Three Stage Least Squares (3SLS) etc. In this study we elect to use the 3SLS, this is because for a number of reasons it has proved superior to 2SLS. Three-Stage Least Squares (3SLS) is a systems method, that is, it is applied to all the equations of the model at the same time and gives estimates of all the parameters simultaneously and it is superior to the 2SLS (Koutsoyiannis. 1977): 479).

We also conduct a set of simulation experiments using the estimated version of the model. The major objective of the simulation exercise is to derive an appropriate set of policy to achieve specific improvement in key macroeconomic aggregates. There are basically two types of simulation: historical simulation and policy simulation. Historical simulation allows for the validation, evaluation of, and counter-factual analysis of the model. The importance of the historical stimulation is clear and straightforward. It enables the model builder to compare the simulated series and the actual series in order to determine how well the macro econometric model "tracks" the economy (Iyoha, 2002). If the simulated values for all or most endogenous variables are very close to the actual values, then one is forced to conclude that the econometric model well describes the structure of the Nigerian economy. We intend to use the root-mean-squared error (rmse), root-mean-squared percent error (rmpe), Theil's inequality coefficient and the correlation coefficient between the actual and simulated values of Key endogenous variables to evaluate the performance of the model. The dynamic stimulation for this work would be undertaken for the period 1970 – 2004.

The purpose of policy stimulation is to enable the researcher predict the response of Key endogenous variables to changes in identified policy instruments such as government expenditure and money supply. As observed by Iyoha (2002) predicting policy responses is more or less indispensable of effective macroeconomic management and policy analysis.

111 Summary of major findings

Nineteen equations were estimated using the Three Stage Least Squares (3SLS) estimation technique and historical simulation was performed to find out how well the model tracked the actual data series. The results of the simulation exercise were evaluated by making use of the simulation error statistics (the result is reported in table 4.2 and 4.3). The evaluation of the model shows that the predictive performance of the model was quite adequate. The need to evaluate a model through the use of correlation coefficient, Root-Mean Squared Error, Mean Error and Theil's inequality coefficient was demonstrated albeit not reported here to save space.

The quantitative result based on 3SLS shows that money supply process in Nigeria is explained by fiscal deficit and one year lag of money supply. Inflation equation agrees with maintained hypothesis that inflation in Nigeria is caused by excessive money supply, exchange rate depreciation and opening up of the economy to foreign competition. In the demand for currency outside bank, saving deposit, and time deposit equations, the results show that GDP, interest rate and inflation are the significant factors that influenced them. In the fiscal block, the banking system credit to government and the level of productivity are all significant variables affecting government expenditure and revenue. In the demand block, monetary variables such as interest rate and money supply are the significant variables influencing consumption and investment behaviour of households and firms. Monetary variables also enter the aggregate supply block via credit to manufacturing and agricultural sectors as well as the cost of capital. These monetary variables were found to conform to a priori expectation and were statistically significant.

The increase in banking system's credit to the production block, which results in increased productivity, enters the labour market through the increase in labour demand. This is because GDP, which is a proxy for the level of economic activity conform to a priori economic expectation and is

statistically significant in the labour demand, supply and unemployment equations. In the external sector, monetary variables enter through exchange rate, money supply and interest rate channels. Thus, overall monetary variables interact with various sub-sectors of the Nigerian economy through money supply, exchange rate and credit channels.

The simulation result reveals that more money supply means higher output, employment and a higher price level. If the growth in money supply is maintained at 5 per cent, this would reduce inflation and manufacturing output by about 2.11 and 0.41 percentage points respectively. In the external sector, a 5 per cent growth rate in money supply will reduce raw materials imports and capital goods import by 0.15 and 0.84 percentage points respectively. A growth rate of money supply of 5 per cent will boost domestic consumption by about 12.84 per cent. The simulation result also reveals that reducing money supply by 20 percent leads to a fall in inflation faster than if money supply was reduced by 10 per cent.

IV. Policy Recommendations

The study has unfolded the mechanics through which monetary variables interact with such sectors as fiscal, real and the external sectors. The result shows that growth rate in money supply is fuelled by large fiscal deficit and therefore there is need for fiscal discipline by keeping to budgetary provisions.

The result of the inflation equation based on 3SLS reveals that inflation in Nigeria is caused by domestic and external factors. Domestic factors brought about by excessive growth in money supply and on the external front greater opening up of the domestic economy to foreign competition. This means that there is urgent need to boost domestic production. Thus, the current policy of outright ban on importation of certain commodities that can be produced locally should be sustained.

In the production block it was clear that credit to that sector, price level, interest rate and technology were significant factors influencing growth rate of output. This means that the current consolidation of banks should be sustained. To promote output, the government should encourage technological advancement which involves both invention (the discovery and development of new products or new productive techniques) and innovation (the practical or commercial application of such discoveries and techniques in the production of goods).

The banking system plays a crucial role in the transmission of monetary policy via its credit to agricultural sector, manufacturing sector and government. Therefore current reform agenda in the banking system as well as the NEEDS requirement of fiscal discipline should be sustained in other not only to sustain the growth in output that is urgently needed but to sustain higher growth with tolerable inflation.

There are other alternative policies scenarios which could be exploited to shed more light on the effectiveness of monetary policy. To this end we suggest the use of exchange rate, bank credit as alternative policy stimulation experiment in future studies of this nature.

V. CONCLUSION

The general conclusion suggested by the findings of this study is that a tight monetary policy designed to achieve stable inflation and exchange rate is likely to have significant and undesirable effects on output and employment. The simulation result shows that a 10 per cent decrease in money supply leads to a reduction in inflation rate by 2.17 percentage point while output and labour demand reduce by 0.41 and 0.35 percentage points respectively. This fall in output and labour demand as a results of monetary squeeze may well impose a heavy burden in a developing country like Nigeria, both because incomes are already near the subsistence level and because the employment effect is likely to fall disproportionately on the nascent industrial sector. Thus, in conclusion the study shows that there is a trade off between higher GDP growth and inflation in Nigeria.

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APPENDIX

Estimates of the Equations of the Model using 3SLQ

4.1.1(b) Money Supply Equation

Parameter	Estimate	Error	t-statistic	P-value
A0	65057.9	39109.7	1.66347	[.096]
A1	.216206	.870689E-02	24.8316	[.000]
A2	5455.42	3234.80	1.68648	[.092]

DW=1.59

4.1.2(b) Inflation Equation

B0	.715947	2.83223	.252786	[.800]
B1	.069334	.015258	4.54406	[.000]
B2	-.238268	.055904	-4.26213	[.000]
B3	.455016E-02	.185244E-02	2.45631	[.014]
B4	.511553E-02	.559131E-03	9.14907	[.000]

DW=2.01

4.1.3(b) Demand for Currency Outside Banks

C0	.465758	1.98963	.234093	[.815]
C1	.241093	1.37011	.175967	[.860]
C2	-.777914E-02	.016595	-.468759	[.639]
C3	.711567	.473276E-02	150.349	[.000]
C4	-1.17931	.037520	-31.4316	[.000]

DW=1.98

4.1.4(b) Demand for Savings Deposit

D0	.193912	.952919	.203493	[.839]
D1	.152810	.295861	.516494	[.606]
D2	-.299252E-02	.329652E-02	-.907781	[.364]
D3	-.332364	.944265E-03	-351.982	[.000]
D4	.060123	.044781	1.34261	[.179]

DW=1.99

4.1.5(b) Demand for Demand Deposit

E0	.139033	1.46490	.094909	[.924]
E1	617928	.123054	5.02159	.000]
E2	.842503E-03	.159945E-02	-.526746	[.598]
E3	-.517929	.537283E-03	-963.978	[.000]
E4	.291936	.018352	15.9077	[.000]

DW=1.98

4.1.6(b) Demand for Time Deposit

F0	.446523	.712426	.626764	[.531]
F1	-3.67694	.656615	-5.59984	[.000]
F2	.020768	.010481	1.98156	[.048]
F3	-.270826	.296455E-02	-91.3550	[.000]
F4	-.643664	.082286	-7.82232	[.000]

DW=1.95

FISCAL BLOCK EQUATIONS

4.2.1(b) Government Expenditure Equation

M0	.338763	.052886	6.40550	[.000]
M1	-.337251	.377209	-.894070	[.371]
M2	-.855600E-02	.248421E-02	-3.44415	[.001]
M3	-.083463	.066726	-1.25082	[.211]
M4	-.367974	.024643	-14.9323	[.000]

DW=1.54

Table 4.7 Continues

4.2.2(b) Government Revenue Equation

N0	.995297E-02	.183039	.054376	[.957]
N1	.662612	.934567	.709005	[.478]
N2	.365186	.184588	1.97839	[.048]
N3	-.061321	.089722	-.683457	[.494]

DW=1.21

Aggregate Demand Block Equations

4.3.1(b) Consumption Equation

Q0	-1.45831	.641148	-2.27453	[.023]
Q1	.202999	.054333	3.73620	[.000]
Q2	.066327	.011710	5.66432	[.000]
Q3	.856990	.032651	26.2467	[.000]

DW=1.80

4.3.2(b) Gross Domestic Investment Equation

P0	-12.5431	5.32418	-2.35587	[.018]
P1	1.58483	.476118	3.32866	[.001]
P2	-.042734	.013184	-3.24130	[.001]
P3	.017792	.458288E-02	3.88218	[.000]
P4	.112310	.063310	1.77398	[.076]

DW=1.66

AGGREGATE SUPPLY BLOCK EQUATIONS

4.4.1(b) Manufacturing Output Equation

T0	17.8408	.473885	37.6479	[.000]
T1	-.336126	.014690	-22.8811	[.000]
T2	.242112	.823841E-02	29.3882	[.000]
T3	-.703049E-02	.137539E-02	-5.11163	[.000]
T4	.117777	.508945E-02	23.1415	[.000]
T5	-3.40552	.111116	-30.6484	[.000]

DW=0.54

4.4.2(b) Agricultural Output Equation

S0	8.97717	1.99653	4.49639	[.000]
S1	-.330523	.036884	-8.96122	[.000]
S2	.015322	.314932E-02	4.86522	[.000]
S3	.163213	.014570	11.2017	[.000]
S4	.228392	.477848	.477960	[.633]

DW=0.58

LABOUR MARKET EQUATIONS

4.5.1(b) Labour Demand Equation

U0	21.6620	3.11788	6.94766	[.000]
U1	-1.06749	.270162	-3.95130	[.000]
U2	-.038896	.021338	-1.82284	[.068]

DW=0.61

4.5.2(b) Labour Supply Equation

V0	1.65854	4.35229	.381073	[.703]
V1	.917086	.368813	2.48659	[.013]
V2	-.094389	.044465	-2.12278	[.034]

DW=0.37

4.5.3(b) Unemployment Equation

W0	356.138	103.585	3.43813	[.001]
W1	-29.0104	8.93813	-3.24569	[.001]
W2	.028018	.076080	.368269	[.713]
W3	1.24729	.846595	1.47330	[.141]

DW=0.27

Table 4.7 Continues

EXTERNAL SECTOR EQUATIONS

4.6.1(b) Exchange Rate Equation

G0	.293600	.157784	1.86077	[.063]
G1	.013550	.014020	.966461	[.334]
G2	.473618	.507168	.933849	[.350]

DW=1.80

4.6.2(b) Consumer Goods Import Equation

H0	5.34942	5.55283	.963367	[.335]
H1	.047278	.497823	.094968	[.924]
H2	.968222	.053250	18.1825	[.000]
H3	.229293	.047574	4.81969	[.000]

DW=1.13

4.6.3(b) Raw Materials Goods Import Equation

J0	.613205	.162759	3.76757	[.000]
J1	-.041779	1.25786	-.033214	[.974]
J2	-1.50576	.244289	-6.16385	[.000]
J3	-.346298	.072935	-4.74802	[.000]

DW=1.54

4.6.4(b) Capital Goods Import Equation

K0	.406438	.133886	3.03571	[.002]
K1	-1.43372	1.18943	-1.20538	[.228]
K2	-.254012	.303486	-.836982	[.403]
K3	-.624475	.100431	-6.21795	[.000]

DW=1.45

Table 4.2: Summary of dynamic policy simulation based on monetary policy (cumulative)1995-2004

		5% increase in ms	10% decrease in ms	20% decrease in ms
1	Inflation	-.211	-2.176	-2.76
2	Exchange rate	3.67	3.58	4.04
3	Consumer imports	0.0447	0.035	0.089
4	Raw materials imports	-0.15	-0.15	-0.74
5	Capital goods imports	-0.84	-0.85	-
6	Government expenditure	-0.32	-0.32	-0.3116
7	Government revenue	-0.28	-	-0.24
8	Consumption	12.84	12.81	12.95
9	Gross domestic investment	0.76	0.74	0.85
10	Agricultural output	0.41	0.41	0.41
11	Manufacturing output	-0.42	-0.41	-0.42
12	Demand for labour	-0.36	-0.36	-0.36
13	Labour supply	1.11	1.12	1.04
14	Unemployment	3.09	3.13	2.71

Source: Compiled by the Author

Table 4.3 Historical simulation: Summary statistics

		CORRELATION COEFFICIENT	RMSE	MEAN ERROR	THEIL'S INEQUALITY COEFFICIENT	
					1961	1966
1	Money supply	0.76899	1.2684	-5.7784	0.061446	0.12243
2	Inflation	0.36837	16.73830	1.2643	0.32765	0.61380
3	Exchange rate	0.95724	0.62821	4.96705	0.11272	0.22287
4	Consumer imports	0.94991	0.82872	4.3348	0.0407	0.081544
5	Raw materials imports	0.96522	0.68318	-2.8899	0.034147	0.68251
6	Capital goods imports	0.93681	0.85065	1.4449	0.040468	0.080800
8	Government expenditure	0.98955	0.29800	4.33488	0.013571	0.027140
9	Government revenue	0.89318	0.99215	4.33488	0.044930	0.089695
10	Consumption	0.73679	1.81555	2.8899	0.075369	0.15025
11	Gross domestic investment	0.38251	0.68274	2.88992	0.057099	0.11381
12	Agricultural output	0.97341	0.16244	-2.88992	0.0075634	0.015726
13	Manufacturing output	0.96495	0.13986	-7.2248	0.015710	0.031413
15	Demand for labour	0.25377	0.66677	1.44496	0.036432	0.72766
16	Labour supply	0.34607	0.87251	-2.8892	0.038429	0.076773
17	Unemployment	0.46853	19.15149	-2.3119	0.23743	0.46078

Source: Compiled by the Author