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BEHAVIOURAL RELATIONSHIP BETWEEN FISCAL POLICY ADJUSTMENT AND STOCK PRICES IN NIGERIA

A CO-INTEGRATION AND ERROR CORRECTION APPROACH

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Abstract

This paper examines the behavioural relationship between government fiscal policy adjustments and stock prices in Nigeria during the period 1985 – 2012. Time series property of the data was tested using Augmented Dickey-Fuller (ADF) test for stationarity. The study employed the method of ordinary least square (OLS), co-integration, and error correction mechanism (ECM). The result revealed a significant and negative impact of public expenditure on stock prices, while government domestic debt outstanding exerts a significant and positive influence on stock prices. The outcome of data analysis also shows a significant and positive relationship between non-oil revenue and stock prices, while the two-period and three-period money supply have significant relationship with stock prices. The study therefore concludes that adjustment in government fiscal actions through the instrumentality of government expenditure; taxes and government borrowing have profound impact on stock prices. On this basis, the authors made the following recommendations, among others: appropriate fiscal policies should be designed and implemented to bring their desired impact on stock market activities; it is imperative for the government to check the rate of stock price changes by regulating its expenditure, reducing fiscal deficits and channeling funds to productive sector and fiscal actions must be complimented with appropriate monetary actions to yield desirable impact on stock prices.

Keywords: Adjustment, Behavioural relation, Co-Integration, Fiscal Policy, Price, Stock

INTRODUCTION

The controversy as to whether fiscal policy exerts any significant influence on stock market activities has been on the front burner of discourse among experts in behavioural finance. While some scholars argue that fiscal policy operations have no effect on stock market activities, others like Plosser (1982), Darrat (1988), McGrattan and Prescott (2001) as well as Afonso and Songa (2009) posit that fiscal actions could affect stock market activities through changes in the rate of interest, portfolio adjustment/revaluation, changes in investment as well as changes in aggregate demand in the economy thus affecting asset prices and the entire economy.

The Keynesian school opines that the analysis of the interactions between fiscal policy actions and interest rates suggest that stock market activities cannot be completely independent of fiscal policy shocks. Changes in fiscal instruments (like government spending, taxes and other revenue items) can change market interest rates instantaneously and force investors to revalue their asset (stock) holdings. As such, the value of investors' wealth (which includes equity holdings), derived by the summation of the discounted value of future cash flows could be affected by an easing or tightening of fiscal policy (Reilly and Norton, 1999).

Meek (1960), hypothesized that to encourage the growth or activities of capital markets the government should increase the availability of alternative sources of public finance, reduce tariffs in order to make the market more competitive and pursue economic stabilization policies. These policies, working together, could create an open competitive market that attracts entrepreneurs to invest in the capital market without fear of losing their investment due to unsound government fiscal policies. Tax and expenditure policies are examples of how the government attempts to control investment and indirectly the depth and breadth of capital market as well as stock prices.

In the literature of finance, fiscal policy action such as changes in government expenditure or increase in taxes with government spending remaining unchanged, for instance, lowers after-tax expected returns on assets and hence prices since they discourage rational investors from further investing in the stock market. On the contrary, optimal fiscal policy mix builds investors' confidence and helps stimulate their investment activities. Thus, government revenue and spending adjustments are expected to have profound effect on stock prices (Reilly and Norton, 1999; Levine, 1991).

Capital expenditure seems to portend some impact on stock market activities than recurrent expenditure. However, the expected effect of capital expenditure decisions on stock prices depends to a large extent on the market's assessment of the quality of its investment opportunities. For example, Desai, Wright and Chung (2003) studied investment opportunities and market reaction to capital expenditure decisions and opined that announcements of

increases (decreases) in government capital spending positively (negatively) affect the stock prices of companies with valuable investment opportunities. For such firms, the market reacts favourably to increases in government capital budgets but negatively to decreases in capital budgets of government. On the contrary, for firms with poor investment opportunities, the prices of their stocks react negatively to increase in the capital budgets but positively to decrease in capital budgets.

Despite the fact that investigations of the linkage between fiscal policy and stock prices are well documented in finance literature for the developed and other developing countries, only a few body of research has attempted to thoroughly examine the time series property of fiscal policy actions and their influence on stock market prices in an emerging economy like Nigeria. This presents research challenge. It raises the question of the empirical validity of the theories that postulate that stock market activities do respond to government fiscal policy actions over time. It also calls for the re-examination of government policy actions directed at the financial markets and particularly the capital market with a view to finding out whether such policy actions have achieved their desired objectives in Nigeria.

Financial economists, analysts and policy makers alike do attempt to predict and explain the nature of the behavioural relationship between fiscal policy adjustments and stock prices. Is the fluctuation in stock prices, in part, explained or induced by adjustments and variations in fiscal policies? In view of the above, the 0bjective of this paper therefore, is to investigate the nature and extent of the relationship between government fiscal policies and stock prices in Nigeria.

From the foregoing, the paper is streamlined thus: section one is the review of related literature, methodology of the study is section two while section three is results presentation, section four is the discussion of results, summary of findings, policy implications and conclusion.

REVIEW OF EMPIRICAL LITERATURE

Empirical submissions on the linkage between fiscal policy operations and stock market performance differ significantly among researchers. The opinion that some form of relationship exists between the variables is largely supported by finance literature. However, a review of existing studies shows that some reported findings are in conflict with theories. For instance, Laopodis (2006) examined the dynamic linkage between the federal government budget deficits and the stock market performance indicators for the period 1960 to 2004 in the USA. The empirical results show a higher sensitivity of stock market indices to taxes relative to government spending.

In a two-country study, Razin (1987) used a stochastic general equilibrium model to address the issues concerning the effects of government tax and spending policies on private sector consumption, asset portfolios and stock market valuations. The key result of the study is that the consequences of expected future policies and the characteristics of their international transmission depend critically on the precise variability of these policies across states of nature. That is, the effects of current policies on consumption, savings and stock market prices are shown to conform closely to the predictions of the corresponding certainty inter-temporal model. Darrat (1988), focusing on whether current stock returns fully incorporate all past fiscal policy actions of government in Canada, using quarterly data for the period 1960 to 1984, and utilising the ordinary least square (OLS) method, found that changes in fiscal policy stance play an important role in determining stock market returns. The study further revealed, after controlling for the effects of fiscal policy on the required return to capital, that there is empirical evidence indicating the presence of a significant lagged relationship between fiscal policy measures and current stock prices. As such, the study found conclusive evidence in support of the condition that fiscal policy influences stock prices.

In a related study investigating the nexus between fiscal policy shocks and movements in asset markets in the U.S, U.K, Germany and Italy using a VAR framework, Afonso and Sousa (2009) found that it is important to explicitly consider government debt dynamics when assessing the macroeconomic effects of fiscal policy on asset markets. Again, the results from the VAR analysis suggest that fiscal policy shocks exert minor influence on the asset markets of the U.S and Germany; fiscal policy shocks substantially increase the variability of stock prices in the U.K and government revenue shocks have apparently contributed to the increase in stock price volatility in Italy.

In addition, Ezirim, et al (2010) reported that public expenditure growth has been seen to significantly and positively precede persistent price increases in Kenya, United Kingdom and the United States of America but not in Nigeria. It was also found that price increases significantly affect public expenditure growth in Kenya and the United States of America.

Rad (2003) examined the effect on prices of government revenue and expenditure in Iran and employing the simultaneous equation system on quarterly data. The author found that growth in government budget deficits positively correlates with the persistent rise in asset prices during the period under study.

Fatas and Mihov (2001) considered a cholesky ordering in the identification of fiscal shocks. They reported that increase in government expenditure leads to growth in private investment that more than compensates for the fall in private consumption, a feature that goes against the predictions of the Real Business Cycle Model.

Plosser (1982) studied the effect of changes in government purchases and changes in public debt on Treasury bill rates in the United States of America and found that government spending significantly but negatively correlates with Treasury bill rates while government debt has weak correlation with interest rates. McGrettan and Prescott (2001) showed that the fall in effective tax rates led directly to the doubling in equity values as a share of GDP, as investors recognised the increased opportunity for investing, stimulating the demand for equities and raising equity/stock prices.

Leeper and Yun (2005) analysed fiscal theory adopting Slutsky-Hicks decomposition method and reported that revaluation effects arise whenever tax changes alter the value of outstanding nominal government liabilities by changing the price level. Under certain fiscal behaviour, the revaluation effects reflect the fiscal theory mechanism such that, when taxes change, two Laffer curves arise, suggesting that a tax increase can either lower or raise the price level and the revaluation effect can be positive or negative, depending on which side of the particular Laffer curve the economy resides.

Travares and Valkanov (2003) who investigated the effect of tax spending on quarterly market returns on stocks, government bonds and corporate bonds in the United States of America from 1960 to 2000 using co-integration, standard deviation and ordinary least squares techniques reported that a one standard deviation increase in the share of tax receipts has a statistically significant effect on stock returns by 4% and 9% at quarterly and yearly horizons respectively. The impact is also similar for stocks and bond returns. The result also indicated that government spending has positive and statistically significant impact on expected returns for bonds at short horizons. These imply that fiscal policy shocks account for about 3% to 4% of variation in excess stock returns and about 8% to 10% of the variation in excess bond returns. They posited that fiscal policy is an important source of return volatility and strongly suggest that fiscal policy shocks should be given serious consideration in asset pricing.

In a cross-country study, Lee (2007) investigated whether fiscal policy affects stock markets in Belgium, France, Germany, United Kingdom and the USA using Granger causality test, Vector Error Correction Model (VECM) and vector autoregressive estimates (VAR) techniques. The study employed quarterly data on stock prices, Federal budget deficits, money supply and industrial production from 1974-1998. Empirical results of the study revealed that the stock market in Belgium did not fully capture and reflect publicly available information on fiscal policy proxied by government budget deficits unlike in the other countries where fiscal policy significantly affected aggregate stock prices. The study also found out that the stock markets of all the five countries fully and accurately captured publicly available information on money supply.

In a related study, Afful and Asiedu (2013), examined the influence of fiscal policy and stock market activity on the lending-deposit rates spread in Sub-Saharan Africa using data from Botswana, Ghana, Mauritius and South Africa. The empirical findings showed that when pooled data were used, a positive and significant relationship exists between fiscal policy and the spread and stock market activity. However, when examined separately, and except for South Africa, in all the others, stock market activity had no significant impact on spread.

The paper by Da, Warachta and Yun (2012) investigated whether counter cyclical government fiscal policies lower equity returns by smoothing consumption spending using annual data on government revenue, government expenditure, and income for the US economy from 1965-2008. The results of the study indicate that consumption volatility and stock returns are lowered by counter- cyclical fiscal policies.

In another work, Hsing (2013) conducted a study to examine the potential impacts of fiscal and monetary policies on stock market performance in Poland. The author applied the GARCH model on quarterly data covering the period 1999.Q2.to 2012.Q4. Empirical findings of the study showed that Poland's stock market index is not affected by the ratio of government's deficit or debt to GDP and is negatively influenced by money market rate. The results further demonstrate that Poland's stock market index is positively associated with industrial production and negatively affected by nominal exchange rate and inflation rate respectively.

From the review of empirical literature above, it is evident that studies on the relationship between fiscal policy adjustments and stock prices have shown mixed results. This presents research challenges. It therefore raises the question of empirical validity of the theories that postulate that stock market activities do respond to government fiscal policy actions. It is on this basis that this study intends to contribute to the ongoing debate by thoroughly examining the time series property of fiscal policy actions and their influences on stock market prices in an emerging economy using Nigeria as reference point.

METHODOLOGY AND DATA

The paper recognizes that in a dynamic stock market environment a number of factors are often responsible in explaining observed variability in stock prices. However, fiscal-stock price model have been constructed in this study. The ordinary least square (OLS), and co-integration test adopted in this study presume that variability in stock prices could be explained by a set of four critical fiscal policy variables namely- all share index (SI), total public expenditure (TPE), domestic debt outstanding (DBO), non-oil revenue (NR) and broad money supply (M_2), in which money supply M_2 serves as a control variable to account for the monetary transmission path of

fiscal policy as demonstrated by (Laopodis, 2006) that fiscal policy actions interact with monetary policy to affect stock prices.

The data was sourced from the Central Bank of Nigeria Statistical Bulleting of various issues from 1985 to 2012.

The Model

Based on the theoretical underpinnings and empirical review earlier made in this paper, we hypothesize that stock price is a function of fiscal policy indicators. The relationship between fiscal policy indicators and stock prices is modeled as follows using the log transform of the variables.

$$\text{Log}(SI_t)\ a_0 + a_1\text{Log}(TPE_{it}) + a_2\text{Log}(DBO_t) + a_3\text{Log}(NR_{it}) + a_4\text{Log}(M_{2it}) + U_t \ldots (1)$$

Where

SI	=	All Share Index
TPE	=	Total Public Expenditure (N'Million)
DBO	=	Domestic Debt Outstanding (N'Million)
NR	=	Non-Oil Revenue (N'Million)
M_2	=	Broad Money Supply (N'Million)
U_t	=	Error Term
a_o	=	Intercept
a_1 to a_4	=	Parameters (a_1, $a_4 > 0$ and a_2 ,$a_3 < 0$).

The multiple regression test results are shown in Table 1 and reveal that changes in Federal Government's total Public expenditure positively and significantly impact on All Share Index. The other independent variables namely- Domestic Debt, Non-Oil Revenue and Broad Money Supply do not significantly impact on stock prices (SI). The adjusted R^2 of the estimated multiple regression model is 0.948811 indicating that the model explains approximately 94.88% of the total variation in SI. In addition, the value of the F-statistic is 126.1143 with a p-value of 0.0000 suggesting that the estimated model is a good fit.

However, the Durbin-Watson statistic is 0.803232 which indicates the presence of autocorrelation in the residuals thus rendering the estimated results unreliable for both analysis and policy making. Given the presence of autocorrelation, the Augmented Dickey-Fuller (ADF) unit root test is employed to examine the time-dependent characteristics of the variables in our model.

Table 1: Level Series Multiple Regression Test Results

Dependent Variable: Log (SI)				
Method: Least Squares				
Sample : 1985 2012				
Included observations: 28				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.859272	1.142596	-4.252834	0.0003
Log(TPE)	0.904813	0.436894	2.071013	0.0498
Log(DBO)	0.288038	0.381907	0.754208	0.4584
Log(NR)	0.259468	0.299680	0.865820	0.3955
	-			
Log(M_2)	0.400722	0.272869	-1.468551	0.1555
R-squared	0.956395	Mean dependent var		8.375903
Adjusted R- squared	0.948811	S.D. dependent var		1.888620
S.E. of regression	0.427300	Akaike info criterion		1.297772
Sum squared resid	4.199463	Schwarz criterion		1.535666
Log likelihood	13.16.88loriter.	- Hannan-Quinn		1.370499
Durbin-Watson	0.803232	F-statistic		126.1143
Prob(F-statistic)	0.000000			

The summary of the ADF unit root test results of the variables in our model are presented in table 2. The results show that all the variables except the residuals were stationary after the first differencing. This means that they are all integrated of order one while the residuals (ECM term) are integrated of order zero, at their levels-

Table 2: ADF Unit Root Test Results

Variable	ADF test statistic at 1st diff.	Order of integration
Log (SI)	-3,766793	1(1)
Log (TPE)	-4.028248	1(1)
Log (DBO)	-4.86560	1(1)
Log (NR)	-6.989215	1(1)
Log (M_2)	-4.022961	1(1)
Residual (ECM)	-5.350358	1(0)

Critical Values: 1% -3.756793, 5% -2.981038, 10% -2.629906.

The Johansen co-integration test results are as shown in Table 3. The test assumes linear deterministic trend in the variables with a lag of 1 to 1. Both the Trace and the Maximum Eigenvalue statistics of the unrestricted co-integration rank tests indicate one co-integrating equations at the 5% level of significance. This therefore confirms the presence of one long run dynamic equilibrium relationship among the dependent and independent variables of our model.

Table 3 Johansen Co-integration Test Results

Sample (adjusted): 1987 2012
Included Observations: 26 after adjustments
Trend assumption: Linear deterministic trend
Series: Log (SI) log (TPE) Log (DBO) Log (NR) Log (M_2)
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.834679	83.38994	69.81889	0.0028
At most 1	0.460409	36.59349	47.85613	0.3670
At most 2	0.296489	20.55295	29.79707	0.3861
At most 3	0.239352	11.40949	15.49471	0.1875
At most 4*	0.152311	4.296284	3.841466	0.0382

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinno-Haug-Michelis (1999) P-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eignenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob**
None*	0.834672	46.79645	33.87687	0.0009
At most 1	0.460409	16.04054	27.58434	0.6623
At most 2	0.296489	9.143460	21.13162	0.8207
At most 3	0.239352	7.113207	14.26460	0.4759
At most 4*	0.152311	4.296284	3.841466	0.0382

Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon- Haug-Michelis (1999) P-values

Having established that there is one co-integrating long run equilibrium relationship among the variables in our model, the short run relationship was examined using error Correction mechanism (ECM) within the framework of an Autoregressive Distributed Lag (ARDL) model. An ARDL model incorporates the lagged values of the independent variables among the set of explanatory variables (Gujarati and Porter, 2009).

The ECM corrects for equilibrium by incorporating both the short run and long run effects in a dynamic setting from where an over-parameterized ECM estimates and the corresponding parsimonious ECM results are obtained. The parsimonious ECM estimates are derived by successively deleting insignificant variables from the over-parameterized ECM model until an optimum parsimonious ECM model estimate is achieved.

Appendix 2 presents the results of the estimated parsimonious ECM which incorporates three-lagged values of the explanatory variables and one-period lagged value of the error term ECM.

DISCUSSION OF RESULTS

From the appendix 2, the estimated results of the parsimonious ECM show that Federal Government's Public Expenditure has a negative and significant relationship with stock prices. In addition, all the lagged values of TPE are negatively and significantly related to SI at the 5% level of significance.

The results also indicate that Domestic Debt Outstanding has a positive and significant impact on SI. The one-period lagged value of TPE also impacts positively and significantly on stock prices (SI). The two-period lagged value of TPE however is not significantly related to SI. Furthermore, Non-Oil Revenue exhibits a positive and significant relationship with (SI) just as (NR) lagged one-period impacts positively and significantly on SI. The empirical results also show that Broad Money Supply does not appear to have a significant influence on stock prices. However, both the two-period and three-period lagged values of M_2 do significantly influence stock prices.

The adjusted R^2 of the model is approximately 87.41% indicating that the explanatory variables jointly explain 87.41% of the total variation in stock prices (SI). The F-statistic is significant at a value of 9.872053 and a p-value of 0.009405 which shows that the model is a good fit. The Durbin-Watson statistic value is approximately 2.05 and confirms the absence of any autocorrelation in the ECM model. Thus, the ECM model results are obviously better than the level series multiple regression results.

The error correction term with a coefficient value of -1.02275B is significant and appropriately signed. The ECM value provides an insight with regard to the speed of adjustment of the model from its long run equilibrium in response to any short run shock. The ECM value of -1.022758 therefore indicates that a short-run disequilibrium in the fiscal policy-stock price model will be corrected at a speed of 2.28 % per annum.

SUMMARY OF FINDINGS

It is observed that all the variables in our model are integrated of order one 1(1) using the ADF unit root test. That is, they become stationary after the first differencing.

The Johansen co-integration test conducted in both the trace and the maximum eigenvalue tests report the existence of one co-integration equation among the variables at the 5% level of significance and using a lag interval of 1 to 1. This indicates that there is only one

long run equilibrium relationship among the dependent and independent variables in our fiscal policy-stock price model.

The results of the parsimonious *ECM* show significant but negative relationship between Public Expenditure and stock prices for both the current and lagged values of TPE. This shows that changes in Government total public expenditure have the potential of impacting significantly on the stock market and this finding agrees with the results of earlier works of Darrat (1988), Laopodis (2006), DeLeeuw and Holloway (1985) as well as Hoelscher (1986). However, the observed negative relationship between TPE and SI is in contrast with our apriori expectation but has empirical support in the works of Lee (1997) and Barnhart and Darrat (1989).

Our empirical results also indicate that Domestic Debt Outstanding has a positive and significant relationship with stock prices although the positive relationship is not in conformity with theoretical expectation. An increase in government borrowing (say through the issuance of government securities) to finance its fiscal operations, raises interest rates in the market which in turn lower the discounted cash flows from stocks and thus stock prices (Patelis, 1991; Travares and Valkanov, 2003; Laopodis, 2010).

Furthermore, Non-Oil Revenue has a positive and significant relationship with Stock Prices for both the current and lagged values of the variable. Once again, the observed positive sign is contrary to our apriori expectation. Given that Non-Oil Revenue is derived from sundry taxes (VAT inclusive), duties, tariffs and levies on consumption and production by different economic units in the economy, an increase in Non-Oil Revenue reduces after-tax cash flows on financial assets thus reducing their market prices.

The observed relationship between Money Supply (M_2) and SI in the current period is positive in line with apriori expectation but not significant. However, the two-period and three-period lagged values of M_2 are significant indicating that money supply has a lagged effect on stock prices.

Overall, the reported F-statistic in the parsimonious ECM results is Significant indicating that there is a significant relationship between fiscal policy variables and stock prices in the Nigerian capital market. Thus, we reject the null hypothesis that there is no significant relationship between fiscal policy and stock prices in Nigeria. The observed deviation of the signs of some of the parameter co-efficients in the estimated parsimonious ECM model could be due to the structure of the Nigerian capital market which is largely informationally inefficient such that the market may not always react timely and correctly to fiscal policy stimuli emanating from government fiscal actions.

POLICY IMPLICATIONS

The empirical findings vividly demonstrate that changes in government fiscal actions through the instrumentality of changes in public expenditure, taxes and government borrowing would have profound impact on stock market prices. It is therefore recommended as follows:

(i) Policy makers should design and implement appropriate fiscal policies given their potential impact on the activities in the capital market. In designing fiscal policy, the time and operation lags should be adequately considered.

(ii) It is imperative for the government to check the rate of stock price changes by regulating its expenditure, reducing fiscal deficits and channeling funds to productive sector.

(iii) The federal and state governments should curtail extra-budgetary spending which tends to breed corruption and negative effect on stock prices.

(iv) Fiscal actions must be complimented with appropriate monetary actions to yield desirable impact on stock prices.

(v) Regulations and reforms in the capital market should be strengthened to reduce information inefficiency and to enable the market react timely to fiscal policy stimuli from fiscal actions.

CONCLUSION

The study has shown the behavioural relationship between fiscal policy adjustment and stock prices in Nigeria over the years, which the outcomes vary considerable with some related studies. This is because of the peculiar nature of Nigeria with weak institution and poor management of public resources due to uncontrolled corruption. The methodology of the study robustly captured the variables of the study as shown by the empirical analysis, in which the outcomes led to appropriate recommendations which is expected to improve on the relationship between fiscal policy and stock prices in Nigeria.

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APPENDICES

Appendix 1

OBS	SI	DBO	M_2	NR	TPE
1985	127.30	27949.10	22299.24	4126.70	13041.10
1986	163.80	28438.70	23806.40	4488.50	16223.70
1987	190.90	36789.10	27573.58	6353.60	22018.70
1988	233.60	47029.60	38356.80	7765.00	27749.50
1989	325.30	47049.60	45902.88	14739.90	41028.30
1990	513.80	84093.10	52857.02	26215.30	60268.20
1991	783.00	116198.7	75401.18	18325.20	66584.40
1992	1107.60	177961.7	111112.3	26375.10	92797.40
1993	1543.80	273836.4	165338.7	30667.00	191228.9

1994	2205.00	407582.7	230292.6	41718.40	160893.2
1995	5092.20	477733.9	289091.1	135439.70	248768.1
1996	6992.10	419975.6	345854.0	114814.00	337417.6
1997	6440.50	501751.1	413280.1	166000.00	428215.2
1998	5672.70	560830.2	488145.8	139297.60	487113.4
1999	5266.40	794806.6	628952.2	224765.40	947690.0
2000	81-11.00	898253.9	878457.3	314483.90	701050.9
2001	10963.10	1016974.	1269322.	903462.30	1017997.
2002	12137.70	1166001.	505964.	500986.30	1018178.
2003	20128.94	1257120.	952921.	500815.30	1225956.
2004	23844.50	1297765.	2131819.	565700.00	1383991.
2005	24085.80	1275077.	2637913.	785100.00	1743200.
2006	33189.30	2082007.	3797909.	677500.00	1942588.
2007	57990.20	2941813.	5127401.	1200800.00	2348581.
2008	31450.78	2320310.	8008204.	1336000.00	3078252.
2009	20827.17	3228030.	9411112.	1652700.00	3280772.
2010	24770.52	4551820.	11034941	1907600.00	39.93249.
2011	20730.60	5622800.	12172490	2237900.00	4233013.
2012	28078.81	6537536.	13895389	2628771.39	4199978.

Source: CBN Statistical Bulletin Various Issues & Author's Computation

Appendix 2

Table 4: Parsimonious Error Correction Model Results

Dependent Variable: (Log(SI))				
Method: Least Squares				
Sample (adjusted): 1989 2012				
Included Observations: 24 after adjustment endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.395865	0.167590	2.362096	0.0646
D(Log(SI(-1)))	0.651799	0.127532	5.110882	0.0037
D(Log(SI(-2)))	0.829911	0.164380	5.048733	0.0039
D(Log(SI(-3)))	1.459592	0.204762	7.128221	0.0008
D(Log(TPE))	-0. 706960	0.194685	-3.631309	0.0150
D(Log(TPE(-1)))	-1.857787	0.251516	-7.386364	0.0007

D(Log(TPE(-2)))	-3.151661	0.453015	-6.957075	0.0009
D(Log(TPE(-3)))	-1.073753	0.324284	-3.311146	0.0212
D(Log(DBO))	0.611041	0.168931	3.617095	0.0153
D(Log(DBO(-1)))	1.204235	0.250383	4.809568	0.0048
D(Log(DBO(-2)))	-0.3(1776	0.265552	-1.362350	0.2312
D(Log(NR))	1.531044	0.207135	7.391532	0.0007
D(Log(NR(-1)))	0.416673	0.153168	2.720362	0.0418
D(Log(NR(-2)))	0.194479	0.090475	2.149539	0.0843
D(Log(M_2))	0.631903	0.438641	1.440593	0.2093
D(Log(M_2(-1)))	-0.739175	0.395914	-1.867011	0.1209
D(Log(M_2(-2)))	-1.300326	0.406009	-3.202699	0.0239
D(Log(M_2(-3)))	1.10938	0.398901	2.782492	0.0388
ECM01(-1)	-1.022758	0.131245	*-7. 7921* 18	0.0006
R-squared	0.972632	Mean Dependent Var	0.199548	
Adjusted R-squared	0.874108	S.D. dependent Var	0.323842	
S.E of regression	0. 114903	Akaike info criterion	-1.474742	
Sum squared resid	0.066013	Schwarz criterion	-0.542116	
Log likelihood	36.69690	F-statistic	9.972053	
Durbin-Watson Stat	2.053176	Prob(F-statistic)	0.009405	