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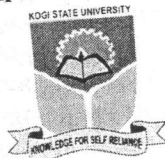
DETERMINANTS OF FINANCIAL DEEPENING IN NIGERIA

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ABSTRACT

The purpose of this paper is to examine the determinants of financial deepening in Nigeria with a specific focus on how financial sector policies, real interest rate and the level of economic activity affect financial deepening. The study is carried out using the Bounds Test approach to determine the long-run and short-run relationship between financial deepening, real output and financial sector policies employing time series data. A financial liberalization index is constructed to show the effect of financial liberalization on financial deepening. The study finds out that in the long run, both the level of economic activity and the real interest rate have a positive effect on financial deepening with only the real interest rate being significant. The financial liberalization index is seen to have a negative and significant effect on financial deepening. The paper recommends the removal of interest rate controls and advocates for the effective implementation of financial sector policies in order to deepen the Nigerian Financial System.

Keywords: Financial Liberalization Index, Financial Deepening, Per capita GDP, Financial Sector policies

Introduction

Financial deepening is defined as the ability of financial institutions to effectively mobilise financial resources for development (Nzotta and Okereke, 2009). Furthermore, the financial system's contribution to the economy is largely dependent on the quality, quantity and efficiency of financial services it provides. Thus the level of development of a financial system largely depends on the effectiveness of various financial policies that exists in the financial sector (Das et al., 2005; Arestis et al., 2003; Nzotta and Okereke, 2009). The study of Robinson (1952) asserts that the development of the financial system is as a result of an increase in economic development such that as the economy expands, the demand for financial services increases to meet the level of development of the economy. Thus a rise in

the per capita GDP of an economy which measures expansion in the economy will lead to a greater demand for financial services.

Prior to the introduction of the Structural Adjustment Programme (SAP) in Nigeria in 1986, the financial system in the country was largely regulated, i.e. financial repression was in place. The system was characterised by rigid exchange rate and interest rate control, mandatory sectoral allocation of credit was in place and there was a quantitative ceiling on bank credits to the private sector. These measures resulted in low investments which made the availability of funds for long term investments scarce (Ayadi et al, 2008). Since the introduction of the SAP in 1986, the financial system has been deepened to make the system more liberalised through the introduction of a number of financial policy measures. Some of the policies introduced to deepen the market and reduce the level of financial repression according to Nzotta and Okereke (2009), were the deregulation of both the banking sector and the capital market, the introduction of the Banking and Other Financial Institutions Acts (BOFIA), the deregulation of interest and exchange rates and the consolidation of both the banking and insurance sectors to further strengthen it in terms of capital adequacy. Thus the financial sector was poised to positively affect economic growth in the country. The process of the removal of financial repression involved a movement from a period of controlled interest rates, an inefficient money and capital market and underdeveloped banking system to one that is characterised by flexible interest rates, improved efficiency of both the money and capital market. These measures served to further deepen the system to positively affect the economic development of the country.

Various studies have similarly shown the relevance of financial deepening in economic growth (Demetriades and Luintel, 1997; Arestis et al, 2001; and Nzotta and Okereke, 2009). There however appears to be a dearth of literature on the determinants of financial deepening in Nigeria. This study thus attempts to empirically examine the factors that determine financial deepening in Nigeria through the examination of the impact of real output and financial policies on financial deepening. In this study, real output is used as the variable to measure economic development while financial sector policies are examined in terms of interest rate restrictions and financial liberalization through the construction of a financial liberalization index using principal component analysis.

Financial Deepening and Financial Sector Policies; A Literature Review

In this paper, financial sector policies are discussed in terms of interest rate restrictions and financial liberalization.

The McKinnon (1973) and Shaw (1973) studies argues in favour of interest rate control removal and the determination of price of credit to be determined by market controlled forces. Interest rate ceilings they argue have a way of distorting the economy and as Demetriades and Luintel (1997) argued, economic development is negatively affected if there is interference in the financial markets through credit rationing that is not left to market forces to determine. This interference discourages business entrepreneurs from investing in high risk although equally rewarding projects such that funds that are borrowed at relatively low cost are rather invested in capital intensive projects. The financial institutions thus become more risk averse and therefore tend to prefer lending to reputable borrowers. Odhiambo and Akinboade (2009) conclude that the interest rate reforms policies through liberalization in Botswana had a positive relationship with financial deepening.

However countering the arguments in favour of interest rate removal are the works of Demirguc-Kunt and Detragiache (1998) and Hellmann et al (2000). These studies assert that removal of interest rates may be rather counterproductive. This it is argued occurs when interest rates are liberalised and the resultant increase in interest rates that normally accompanies such measures leads to financial crises. For example, in Chile, after the financial

sector was liberalized, there was a banking crisis. Nigeria had a similar experience after the introduction of the structural adjustment programme in the country with a view to deregulating the financial sector of which interest rate deregulation was included. This led to a partial regulation of interest rate to control the crisis. Hence the argument for weighing the benefit inherent in the liberalization programme as against the resultant effects.

The effect of financial liberalization on an economy is not so clear cut. While the McKinnon (1973), Shaw (1973) school of thought and proponents of the finance led growth advocate that financial repression can have a negative effect on financial deepening, empirical studies has shown that in the absence of appropriate good macroeconomic policies, financial liberalization can be the cause of instability in the system. According to the McKinnon-Shaw school, financial repression which includes the control of interest rates, high reserve requirements and directed credit programmes amongst other measures, hinders financial deepening which affects the quality and quantity of investment and by implication, result in a slowdown of growth in the financial system. It is also argued by Pagano (1993) that such policy measures leads to a reduction in the amount of resources that are available for financial activities intermediation. However the empirical works that supports the destabilising actions of financial liberalization in the absence of sound macroeconomic policies includes that of Arestis and Demetriades (1997) and Villanueva and Mirakhor (1990). In a study of two groups of countries, Villanueva and Mirakhor (1990) found out that the presence of a stable macroeconomic environment provided an enabling environment for the success of the financial liberalization programme. Arestis and Demetriades (1997) attribute the destabilising effect of financial liberalization on the series of assumptions that underlies the financial liberalization hypothesis such as perfect competition, perfect information and a sound institutional framework. These hypotheses as asserted are unrealistic and are not practicable as evidenced in developing countries in Latin America and Sub-Sahara Africa.

Model Specification and Data

In the context of this study and adopting the work of Ang (2008), financial deepening is measured by the ratio M2 to gross domestic product. Investopedia defines M2 as the category within the money supply that includes all physical money such as coins and currency, demand deposits, savings deposits and non-institutional money market funds. Both interest rate and the level of financial liberalization are included in the model specification to capture the different effects it has on financial sector policies. A financial liberalization index is constructed using the principal component analysis which follows the work of Shrestha and Chowdhury (2006).

This index shows the degree of financial liberalization at a particular time. The index

$$\begin{aligned} \Delta M2Y_t = & \alpha_0 + \partial_1 M2Y_{t-1} + \partial_2 \ln PCP_{t-1} + \partial_3 FLI_{t-1} + \partial_4 RI_{t-1} \\ & + \sum_{i=1}^p \phi_i \Delta M2Y_{t-i} + \sum_{j=1}^q \phi_j \Delta \ln PCP_{t-j} + \sum_{k=1}^q \phi_k \Delta FLI_{t-k} + \sum_{l=1}^q \phi_l \Delta RI_{t-l} \\ & + \mu_t \dots \dots \dots (2) \end{aligned}$$

where $\partial_{i,t}$ are the long run coefficients

$\phi_{i,t}$ are short run dynamic coefficients

Δ is the first difference operator

μ_t is the error correction term and other terms are as defined previously.

Once the existence of a long-run relationship is established, a 2-step procedure is carried out to estimate the model. First, the orders of the lags in the ARDL model are selected using the Schwartz-Bayesian Criteria (SBC) information criteria and the selected model is then estimated by the ordinary least square technique (Pesaran et al, 2001).

In the next stage, the error correction mechanism (ECM) is estimated for the short run relationship. The ECM integrates the short run dynamics with the long-run information. The terms with the summation signs in equation 2 above represents the error correction dynamics.

To ascertain the goodness of fit for the model, diagnostic and stability tests are conducted. While the diagnostics tests investigates the serial correlation, normality and heteroscedasticity of the model, the cumulative sum of recursive residuals and the cumulative sum of squares of recursive residuals are both employed to determine the stability of the model overtime.

Microfit 4.0 windows version software was used in analysing the data.

Financial Liberalization Index

In order to determine the degree of liberalization of the financial system in Nigeria at a particular point in time, an index is constructed using the principal component analysis (Shrestha and Chowdhury, 2006; Laeven, 2003; Waliullah, 2010). For this paper, 12 components are selected namely credit control (CC), stock market deregulation (SMD), establishment of the Nigerian Deposit Insurance Corporation (NDIC), interest rate deregulation (IRD), introduction of prudential guidelines in the banking sector (PG), foreign exchange market deregulation (FEMD), introduction of the Banking and Other Financial Institution Act (BOFIA), the privatization of state controlled banks (PDB), reduction in reserve requirements (RRR), stock trading system automation (STA), introduction of the monetary policy rate (MPR) and banking sector deregulation (BSR).

In calculating the index, the paper assigned some arbitrary values to each of the financial policies where each policy takes on a value of between 0 and 1. 0 for a period when there was full regulation and 1 for full deregulation. For gradual deregulation, values of 0.33, 0.5 and 0.66 were assigned depending on the level of implementation with 0.33 being the lowest level and 0.66, the highest. See appendix 1 for the financial liberalization policy variables and the assigned values. From the values obtained as shown in the appendix, the weight of each component is calculated through the principal component analysis.

The FLI index is expressed as:

$$FLI_t = CC_{t,w} + SMD_{t,w} + NDIC_{t,w} + IRD_{t,w} + PG_{t,w} + FEMD_{t,w} + BOFIA_{t,w} + PDB_{t,w} + RRR_{t,w} + STA_{t,w} + MPR_{t,w} + BSR_{t,w} \dots \dots \dots (3)$$

Where w_t is the weight of the component as given by the eigenvector of the selected principal component (as shown in appendix 2). The first principal component (λ_1) that accounts for 88 per cent of total variance in the policy variables is selected.

3.2 Time Series Properties of the Variables.

Figure I: Real per Capita GDP (\$)

FigureI: Real per Capita GDP (\$)



FigureII: Ratio of Broad Money(M2) to GDP (M2Y)

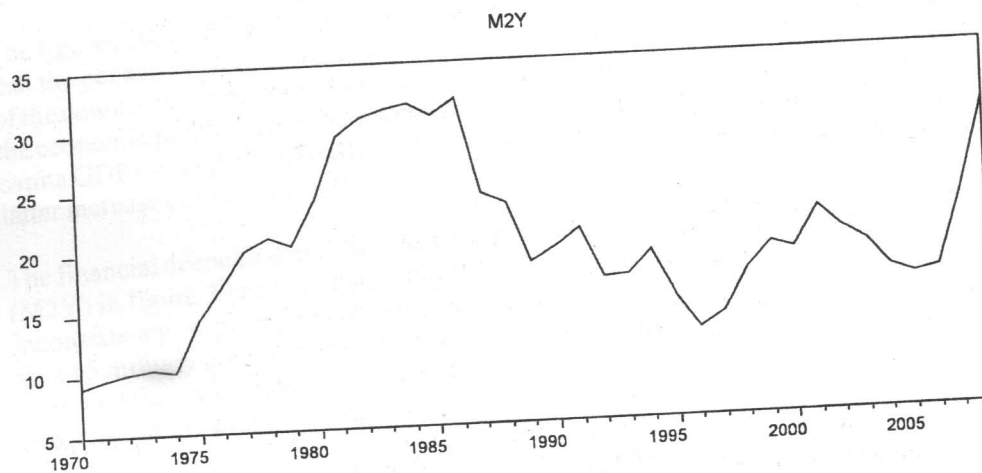


Figure III: Real Interest Rate

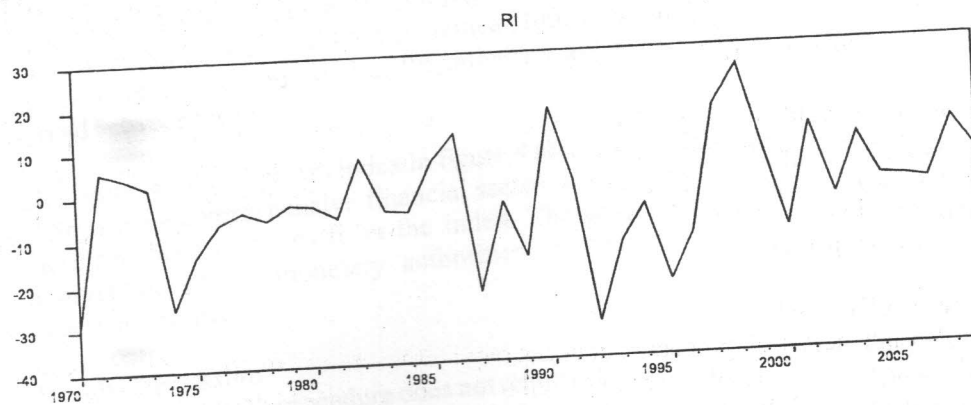
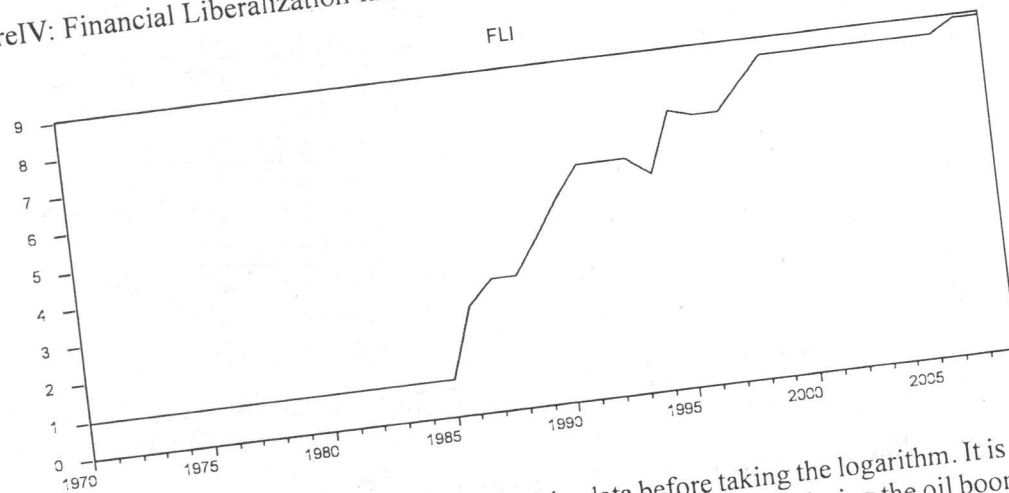


Figure IV: Financial Liberalization Index



The figures above show the times series plot of the data before taking the logarithm. It is seen that the per capita GDP in figure 1 had a steady increase in the 1970's during the oil boom era of the country when the country made a lot of revenue from its crude oil sales. However due to the economic problems the country experienced in the early 80's, there was a decline in the per capita GDP right up till 1986 when the structural adjustment programme was introduced. This latter increase can be added to the various economic reform measures put in place.

The financial deepening indicator which is the ratio of broad money to gross domestic product (M2Y) in figure 2 has largely fluctuated during the period of study. This is as a result of the inconsistency in policy measures by the different government of the day which included about 5 military governments and 3 democratically elected ones. It rose steadily from 1970 to 1986 and thereafter experienced a decline. However between the periods of 1987 to 2008, it experienced a rise and fall largely as a result of policy inconsistencies.

The real interest rate is used to proxy the efficiency of financial intermediation and has fluctuated between negative and positive values during the period of study and this is shown in figure 3. The deregulation of the banking system in 1986 was followed by a large gap in interest rate spreads and as noted by Sanusi (2002), this was due to the oligopolistic nature of the banking system and the thus the monetary authorities had to intervene by limiting the spread between the rates.

The financial liberalization index in figure 4 above indicates a repressed economy right until 1986 when a comprehensive financial sector reform occurred in the country and overtime, there had been an increase in the index. The decline in the 90's was as a result of the intervention of the monetary authorities to stem the banking crisis the country was experiencing then.

Results Discussion

Although the ARDL procedure does not require the test for unit roots, it is necessary to ensure that none of the variables are integrated of an order greater than 1. The table below shows the results of the Phillips- Perron (PP) test for the unit root and indicates that the variables are either $I(0)$ or $I(1)$. Thus we can conveniently use the ARDL procedure.

Table I: Results of Unit Root Test

Variables	PP Statistics	Critical Values	Order of Integration
PCP	-5.926080 [0.0000]	1% = -3.621023 5% = -2.943427 10% = -2.610263	Stationary at first difference
FLI	-5.442050 [0.0001]	1% = -3.621023 5% = -2.943427 10% = -2.610263	Stationary at first difference
RI	-5.721380 [0.0000]	1% = -3.615588 5% = -2.941145 10% = -2.609066	Stationary at level
M2Y	-4.016100 [0.0036]	1% = -3.621023 5% = -2.943427 10% = -2.610263	Stationary at first difference

To test for the presence of a cointegrating relationship, a lag order of one is selected using the SBC (Schwarz's Bayesian Criteria) selection criteria and the result indicates that the null hypothesis of no existing relationship between the variables is rejected at the 10% level of significance as seen in table II below

Table II: Bounds Test Results

Dependent Variable M2Y		F-Statistics Lag order 1 3.893* k= 4
Critical Values	Pesaran et al (2001)	
	Lower bound	Upper bound
1%	4.29	5.61
5%	2.86	4.01
10%	2.45	3.52

*significant at 10% level of significance according to Pesaran et al (2001).

¹ Critical values are obtained from Pesaran et al (2001), Table CI (III): Unrestricted intercept and no trend.

k= number of regressors

The long-run equilibrium relationship is given by table III below

Table III: Long-run equilibrium relationship

	Dependent Variable = M2Y	
	Coefficient	p-value
Intercept	-6.9775	0.000***
$\ln PCP_t$	0.050686	0.304
$\ln FL_t$	-1.1990	0.003***
RI_t	0.34739	0.051*

***= significant level of 1%

*= significant level of 10%

Having established the existence of a cointegrating relationship in table II above, we then proceed to determine the coefficients of the ARDL model in equation 2 above. From the

results in table III above, it is seen that increases in the per capita GDP and real interest rates have a positive effect on financial deepening in Nigeria with only the real interest rate having a statistically significant result. The financial liberalization index is seen to have an inverse relationship with financial deepening and the result is statistically significant.

The per capita GDP is noted not to be statistically significant although it has the expected positive sign with the long-run elasticity of financial deepening to output given at 0.051 even though a statistical significance could not be established. What this implies is that there is no long-run relationship between financial deepening and the level of economic output. The positive sign indicates that with an increase in the level of economic activity in the country, a higher level of financial services is demanded by the economy which in turn can have a positive impact on deposit mobilisation. This result is consistent with the studies of Demetriades and Luintel (1997) and Arestis et al, (2001).

The long-run elasticity of financial deepening with respect to the financial liberalization index is found to be -1.190 and statistically significant at 1% level of significance. This result is in line with the work of Ang (2007) and Arestis et al, (2003) that an imposition of financial repression might actually deepen the financial system. However the success of the financial sector in this regard will largely depend on how effectively the policies are implemented. In this study, the results imply that financial liberalization in Nigeria might help to deepen the financial system.

The result shows that the real interest rate has a significant positive relationship with a long run elasticity co-efficient of 0.347 with respect to real per capita GDP. This implies that the removal of interest rate control has a positive impact on financial deepening (Ang, 2007 and Demetriades & Luintel, 1997). The result further suggests that where interest rate operates according to the demand of the market, there is a greater incentive for savings and investment through the mobilization of funds available in the financial system. It is noted that interest rate is treated as a separate variable from financial liberalization due to the fact that its effect on financial deepening is quite different from that of financial liberalization, hence the different treatment (Arestis et al, 2002).

Table IV: Short-run Equilibrium Relationship

	Dependent Variable = M2Y	p-value
	Coefficient	0.000***
Intercept	-1.9765	0.019**
? lnPGDP _{t-1}	-0.0335	0.001***
? lnFL _{t-1}	-0.3396	0.000***
? RL _{t-1}	0.0984	0.004***
Ecm (-1)	-0.28327	

*** = significant at 1% level of significance.

** = significant at 5% level of significance.

In the short-run, the error correction mechanism (ECM) which measures the speed of adjustment back to the long-run relationship is statistically significant at the 1% level and has a negative sign as expected as seen in table IV above. This indicates the existence of an error correction mechanism and should there be any deviation from the long-run equilibrium, it is the ECM that makes it adjust back to the long-run relationship.

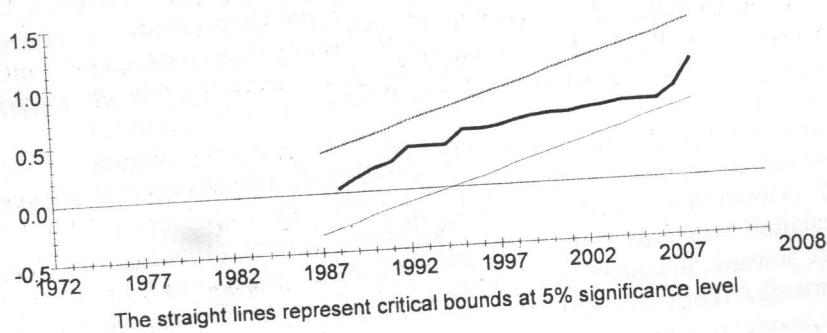
Table V: Diagnostics Tests Results

R^2	0.78612
Adjusted R	0.74472
F- Statistics	22.7882 [0.000]
Serial Correlation	2.2416 [0.134]
Normality	0.51009 [0.775]
Heteroscedasticity	0.46384 [0.496]

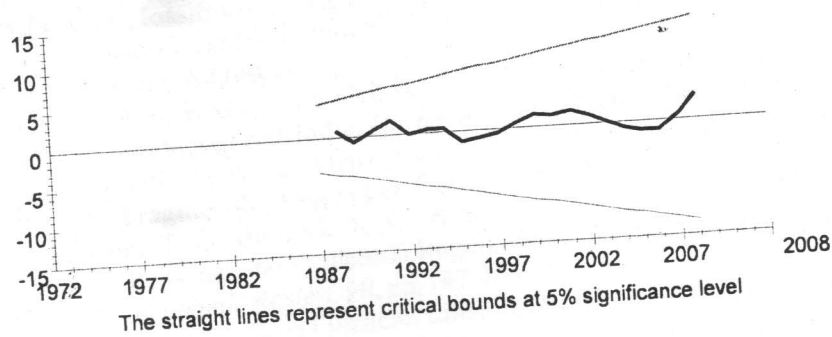
Table V above indicates that the regression specifications fit the ARDL model and passes the diagnostic tests because the results do not show problems of non-normality, heteroscedasticity or serial correlation.

In ascertaining that the estimated regression coefficients are not biased and that the model is not misspecified, we employed the stability test across the period of study using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) test for structural stability (Brown et al, 1975) and found that the regression equation is stable because neither the CUSUM nor the CUSUMSQ test statistics exceeded the bounds at the 5% level of significance implying stability over time. This is graphically illustrated in the figures below.

Plot of Cumulative Sum of Squares of Recursive Residuals



Plot of Cumulative Sum of Recursive Residuals



Conclusion and Policy Implications

This paper investigated the determinants of financial deepening in Nigeria and employed the ratio of M2 to gross domestic product as the proxy for financial deepening. The study found out that in the long run, both the per capita GDP (proxy for the level of economic activity) and the real interest rate have a positive effect on financial deepening although only the real interest rate has a significant effect. The financial liberalization index which was constructed using the principal component analysis is seen to have a negative and significant effect on financial deepening.

The results suggests that financial deepening in Nigeria, depends on the financial sector policies formulated by the government and that per capita GDP is not as important in determining financial deepening. The effectiveness of the financial sector policies will however depend on how it is effectively implemented by the players in the financial system. The result further provides support for the liberalization of interest rates through the removal of interest rate controls in order to encourage savings and investments. This will promote deposit mobilization and will ultimately deepen the financial system.

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Appendix 1 Financial liberalization policies and assigned values.

Year	CC	SMD	NDIC	IRD	PG	FEMD	BOFIA	PDB	RRR	STA	MPR
1970	1	0	0	0	0	0	0	0	0	0	0
1971	1	0	0	0	0	0	0	0	0	0	0
1972	1	0	0	0	0	0	0	0	0	0	0
1973	1	0	0	0	0	0	0	0	0	0	0
1974	1	0	0	0	0	0	0	0	0	0	0
1975	1	0	0	0	0	0	0	0	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	1	0	0	0	0	0	0	0	0	0	0
1978	1	0	0	0	0	0	0	0	0	0	0
1979	1	0	0	0	0	0	0	0	0	0	0
1980	1	0	0	0	0	0	0	0	0	0	0
1981	1	0	0	0	0	0	0	0	0	0	0
1982	1	0	0	0	0	0	0	0	0	0	0
1983	1	0	0	0	0	0	0	0	0	0	0
1984	1	0	0	0	0	0	0.5	0	0	0	0
1985	1	0	0	0	1	0	0.5	0	0	0	0
1986	0.5	1	0	0	1	0	0.5	0	0	0	0
1987	0.5	1	0	0	1	0	0.5	0	0	0	0
1988	0.5	1	1	1	1	0	0.5	0	0	0	0
1989	0.5	1	1	1	1	1	0.5	1	1	0	0
1990	0.5	1	1	1	0.66	1	0.5	1	1	0	0
1991	0.5	1	1	1	0.66	1	0.5	1	1	0	0
1992	0.5	1	1	1	0.66	1	0.5	1	1	0	0
1993	0.5	1	1	1	0.66	1	0	1	1	1	0
1994	0.5	1	1	1	1	1	0.5	1	1	1	0
1995	0.5	1	1	1	1	1	0.5	1	1	1	0
1996	0.33	1	1	1	1	1	0.5	1	1	1	0
1997	0.33	1	1	1	1	1	0.5	1	1	1	0
1998	0.33	1	1	1	1	1	0.5	1	1	1	0
1999	0.33	1	1	1	1	1	0.5	1	1	1	0
2000	0.33	1	1	1	1	1	0.5	1	1	1	0
2001	0.33	1	1	1	1	1	0.5	1	1	1	0
2002	0.33	1	1	1	1	1	0.5	1	1	1	0
2003	0.33	1	1	1	1	1	0.5	1	1	1	0
2004	0.33	1	1	1	1	1	0.5	1	1	1	1
2005	0.33	1	1	1	1	1	0.5	1	1	1	1
2006	0.33	1	1	1	1	1	0.5	1	1	1	1
2007	0.33	1	1	1	1	1	0.5	1	1	1	1
2008	0.33	1	1	1	1	1	0.5	1	1	1	1

Source: Central Bank of Nigeria Statistical Bulletins and The Nigerian Stock Exchange Fact Book for the period under review.

Appendix 2: Eigenvalues and Eigenvectors of the Correlation Matrix for Policy Variables

Variables	Eigenvectors	
	λ_1	λ_2
CC	.982	.521
SMD	.950	.384
NDIC	.947	.463
IRD	.939	.469
PG	.937	.487
FEMD	.920	.426
BOFIA	.918	.515
PDB	.918	.515
RRR	.818	.727
STA	.671	.885
MPR	.333	.844
BSR	.690	.723
Eigenvalues	8.963	1.151

Source: Authors' computation using SPSS Software