

Full Length Research Paper

Exchange rate volatility, stock price fluctuations and the lending behaviour of banks in Nigeria

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Following the recent global economic crisis, so many macroeconomic maladjustments have unfolded in the Nigerian economy. First, the naira exchange rate depreciated sharply and became more volatile than any other time in nearly a decade; the stock market indices have dived very south relative to their previous year's levels and banks, because of their exposure to foreign credit lines, the stock market by themselves and their loan customers- were feared to be on the brink of collapse. Consequently, the Central Bank of Nigeria went to no end of limits to provide liquidity for the banks with a view to forestalling the feared consequences of the crisis. The main concern of researchers and analysts has been to identify the nexus through which the international crisis passed through to the domestic economy. Was the depreciation in the naira exchange rate responsible for the stock market collapse? Or was the reverse the case? Did banks curtail lending because of the depreciation or the fluctuation in the stock indices? This study empirically answers these questions. The vector auto regression (VAR) methodology is applied, treating the data series for temporal properties unit roots and co integration. The impulse response function and the analysis of variance were used to filter the effects of the included variables on bank loans, while the Engel Granger causality confirmed the lines of causation among exchange rate volatility, equity prices and bank loans. Preliminary evidence show that exchange rate volatility and equity price fluctuations affected the behaviour of banks in Nigeria but that the effects were insignificant and that the fluctuation of the stock index caused the naira to depreciate and there was no reverse causality. Changes in bank loans also led to equity price fluctuations and again, there was no evidence of reverse causality.

Key words: Exchange rate volatility, global crisis, bank lending behaviour.

INTRODUCTION

Recent global financial developments, especially the credit crunch and the consequent near collapse of stock markets across the world, have brought to the open the collective vulnerabilities of sovereign economies. Changes in currency prices (exchange rate) are central in transmitting localized economic developments to other geographical domains with regard to its function in trans-border trade and investment. Volatile exchange rate regimes blur the predictability of the net worth of banks' assets denominated in currencies other than the domestic one. It also introduces wide swings in the value of external liabilities, which has consequence for credit creating potentials. In developing countries, banks are principal intermediaries in the loans' market and as such, exchange rate fluctuations which impact adversely on their balance sheets would reduce the quantity of loans

advanced for real activity in the economy.

Owing to information asymmetries, depreciation in exchange rate might cause lending to decline in two different ways. First, if such depreciation worsens borrowers' balance sheets, then the default risk will be enlarged and banks would shy away from making loans. On the other hand, if banks are exposed to short term liabilities in foreign currencies, then such liabilities will be amplified to the tune of the extent of depreciation of the local currency and any other associated costs, thus, dampening their potential to create credit.

The stock market tends to mirror the level of confidence in the economy in general and the financial system in particular. It reflects the strength of the productive sector and expectations about the stability of the financial system. Persistent increases in the stock indices would

encourage banks to increase loans advanced, both for direct investment in the stock market and other sectors of the economy. Foreign investors catch in on the higher returns at the stock market and direct the inflow of foreign portfolio investment to that economy. This further boosts the capital base of banks and induces further increases in lending.

This has been the experience since the 'clean-up' of the Nigerian banking system beginning from 2005. The new status of banks has also, among other things, attuned them to investments abroad. It has also improved their industry rating and consequently enhanced their potential to acquire autonomous foreign liabilities. Foreign assets (net) of banks stood at N796.8 billion in 2007, an increase of 45% over the level in 2005. The acquired global outlook expectedly, should incur more variable flow of foreign resources due to exchange rate volatilities.

The lending behaviour of banks is crucial for the transmission of monetary policy in Nigeria mainly because of the elevated function which the banks play in conveying monetary policy impulses. Exchange rate is pivotal with respect to determining money supply in Nigeria for the fact that monthly monetization of the foreign exchange earnings is a major source of funding for government expenditure. Total expenditure of the federal government fell slightly from 11% of total Gross Domestic Product in 2006 to 10.7% in 2007. Notwithstanding the decline, the non debt component increased by 25.1% over the same period. The total expenditure was also above 50% of total broad money supply. Public sector deposits also form substantial chunk of banks' total deposits. It is therefore, arguable that fiscal actions of government, through exchange rate movements might have definite bearing on the loan behaviour of banks, particularly for oil exporting economy like Nigeria.

Currently, it is a burning issue, especially in Nigeria, how the global economic melt down has impacted on the Nigerian economy. Deposit money banks are the most visible players in the Nigerian financial system. Their lending activities are a major influence on economic activities within the formal sector. The essence of this paper, therefore, is to investigate the nature of the relationship between exchange rate volatilities, equity price fluctuations and the loan behaviour of banks in Nigeria.

Research problem

Recently, the link between economic theory and practical outcomes has come under immense scrutiny. Particularly, the role which monetary policy plays in economic growth has been touted as opaque owing to the legion of transmission channels and the computed time of impact of policy action on real variables. The sheer lack of

consensus on the efficacy of the different frameworks for monetary policy does not also make the effects of monetary policy less contentious. The current global economic meltdown has exposed several weaknesses in the running of the economy, especially as it affects regulation and risk management in the financial system. It has also put to test the traditional tools of monetary policy and the inability of these traditional 'medicines' to salvage the economic down turn has pitched (with more discordant tunes) exponents of discretionary monetary policy more firmly against their opponents.

In all the arguments, what is clear is that the speed of evolution and complexity of modern financial markets have outpaced prudential regulations set for them: Also, the sacred connections between money supply and economic variables – income, wealth, inflation etc., which held at a time is less firm. The challenge before policy makers right now, therefore, is to search out 'new' and working relationships between policy variables and other macroeconomic variables, and among macroeconomic variables themselves.

The problem of tracing policy action through to real variables is more pronounced in developing economies, mainly for two reasons. One, financial markets are shallow and the informal sector is large, making the navigation of policy impulses less frictionless. Two, governments are large and fiscal dominance is inextricable from the complementarity of monetary and fiscal policies.

The situation in Nigeria is not very different from other developing countries. The recent exchange rate depreciation and free fall of the stock market indices, as in other jurisdictions, have been linked to ineffective monetary policy. Particularly, the role of margin loans in sustaining the stock market has received plenty commentary. Deposit money banks are at the centre of monetary policy transmission in Nigeria, being the largest players in all segments of the financial market- foreign exchange, money market, stock market. By how much the current financial crises could be linked to real activity in Nigeria can be ascertained by evaluating the lending behaviour of banks in the face of exchange rate volatilities and equity price fluctuations. This paper aims to achieve this objective.

Objectives

The study will accomplish the following:

- (1) Ascertain the impact of foreign exchange rate volatility on bank loans;
- (2) Identify the line of causality between exchange rate volatility and equity price fluctuations;
- (3) Identify the line of causality between exchange rate volatility and bank loans;
- (4) Infer the impact of naira depreciation on equity prices in Nigeria.

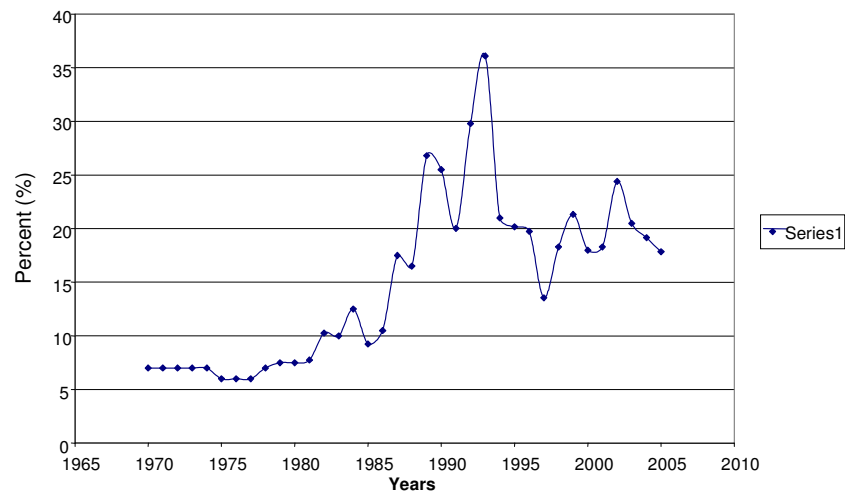


Figure 1. Prime lending rate 1970-2005.

THE LENDING ENVIRONMENT IN NIGERIA

In Nigeria, two broad monetary policy regimes could be distinguished since the establishment of the Central Bank in 1959. The first regime was characterized by direct administrative controls on credit and interest rates, while the other dwells on the era where credit to the private sector was competitively distributed. In the first period (until 1986) banks were assigned mandatory guidelines on how much credit to make to preferred sectors of the economy. More so, minimum cash ratios were stipulated and special deposits were used to control free reserves with banks. Thus, banks made most loans essentially in order to meet government regulations and not necessarily based on the expected returns. The wisdom of this era was to stimulate growth of the domestic economy by delivering credit at low interest rates, while pegging and defending the naira from wanton depreciation, mainly motivated by the need to avoid foreign inflation in imported intermediate and capital goods.

According to Nnanna (2001) historically, the Central Bank of Nigeria via its monetary policy circulars had directly controlled the volume and cost of credit in the economy, until the era of financial sector liberalization in the mid-80s. He also found in the same study that distortions in the pricing of loans caused by the administrative intervention in the market rendered financial intermediation by the deposit money banks ineffective. In the era of liberalized interest rates beginning from 1993, deposit money banks engaged in diligent credit packaging and risk analysis before making loans in order to reduce carrying non-performing assets in their books. Consequently, loans were advanced based on the computed returns to investment and the relative risk in the borrowing sector. The major consequences of liberalization have been increases in the volatility of interest rates and increased sensitivity of the exchange

rate to domestic economic developments and external shocks, which eventually affected prices and consequently, increased the sensitivity of exchange rate to the interest rate as stable exchange rate helped lock-in inflation.

From 1970 to 1985 (Figure 1), which marked the period of strict administrative controls, the standard deviation of the prime lending rate was 1.8 and rose to 6.8 in the period between 1986 and 1992. During this period the economy had become liberalized to a large extent, but interest rate liberalization only came in 1993. However, the extent of dispersion of interest rate slowed to 5.3% in the years since 1993. The wide dispersion in the years after direct controls is indicative of the effects of market interactions and administrative frictions in the policy break point, while the relative convergence after 1993 could be explained by the numerous entries in the banking industry and improved efficiency of the intermediation process.

Nnanna and Dogo (1998) have shown that financial liberalization has led to increased credit to the private sector of the economy. However, evaluating the sectoral distribution of loans by the deposit money banks in Nigeria, it could be observed that the real sectors of the economy have not benefited proportionately. This situation could be attributed to the relative high risk and the long period of pay back associated with the sector.

Foreign exchange movements have been pivotal in the supply of money in the Nigerian economy, particularly, since the commercial exploration of crude oil. Foreign exchange policies have essentially sought to ensure a healthy balance of payments and the attainment of a stable exchange rate. Before deregulation of the economy external sector policies depended on foreign exchange allocations and administered exchange rates. In the circumstance, the levels of money supply flowing from net foreign earnings were fairly stable and predictable.

However, the relative effectiveness of monetary policy was reduced since the fixed exchange rate had to be defended regularly. With the deregulation of the economy, it was envisaged that the attainment of macroeconomic stability would eliminate distortions in the external sector, stimulate non-oil exports, increase foreign exchange inflows and moderate demand in the foreign exchange market. The immediate outcome of the foreign exchange deregulation was counter productive as the parallel market flourished; the exchange rate depreciated freely and became more unstable, while the external sector remained under immense pressure. The large premium between official exchange and parallel exchange rates caused banks to increase their investments in the foreign exchange market, reducing the share of investible funds devoted to actual loans.

However, in February 2006, the foreign exchange market was further liberalized, reducing restrictions to access foreign exchange through easier documentation requirements and increase in the amount and frequency of access to foreign exchange in Business travel and Personal Travel Allowances. The Whole Sale Dutch Auction System replaced the Retail Dutch Auction which had been in place since July, 2002. Perhaps, the boldest liberal move by the CBN was the admission of Bureau de Change companies to the official window for foreign exchange. As a consequence, the inter bank foreign exchange rate converged with the parallel rate, a goal which had been elusive over several policy regimes.

LITERATURE SURVEY

Traditional literature links the extent of bank lending to the level of economic activity and interest rate. Growth in the Gross Domestic product calls forth greater investment and greater demand for bank loans. While low interest rates encourage consumption and grow loans. Greene and Villanueva (1991) show strong negative correlation between real interest rates and private investments. Following are other factors that influence the lending behaviour of banks.

By regulation, the single obligor limits for lending connects the size of a bank's balance sheet to the volume of loans it can make to an enterprise. Literature on capital adequacy and other prudential guidelines are extensive and their links to the lending pattern of banks have been well documented in the literature including (Kashyap and Stein, 2000; Benanke and Gertler, 1987) Both studies infer that in situations of credit constraints, the level of capital will determine the extent of bank lending. However, it has been argued that though it might appear apparent that the level of banks' capital does matter for the volume of lending, what is less clear is whether the trends in bank loans are caused by variations in capital or by cheer changes in the level of demand for bank loans (Sharpe, 1995).

Financial liberalization, particularly external finance liberalization and stock price movements also influence bank lending. Financial liberalization unleashes mixed impact for economic agents in the loans market. For companies, while the international sources of capital are opened including share offers and the relative price of foreign capital tends to decline. For banks, competition heightens and the interest rate spread diminishes. Financial liberalization also improves the ability of domestic banks in developing markets to improve on credit packaging and risk assessment. Overall, the loan base for banks is enlarged. Olaf et al. (2007) summarizes the arguments for financial liberalization in Thailand by stating that the good news is that liberalization makes borrowing cheaper and easier as it decreases interest rate spreads and reduces collateral requirements. Moreover, it modernizes the financial system by enlarging the power of market forces at the cost of traditional institutions, here reflected in a declining importance of collateral based and relationship lending. However, one of the downsides of financial liberalization is the fact that more risky ventures could be financed by banks and in the face of reduced collateral requirements. Banking becomes more risky by greater interest rate and exchange rate changes (Stiglitz, 2004).

Equity price fluctuations may affect the lending behaviour of banks, especially where banking regulations do not impose explicit ceilings on lending. In such operating environments, loans flow freely to sectors where return on investment is higher and risk is well understood and could be managed. The connection between equity price fluctuations and lending behaviour of banks could be traced in diverse dimensions. In jurisdictions that banks hold equities in their portfolio of investments, an increase in share values will boost the size of banks' balance sheets and encourage increased lending. The reverse will play out when equity prices dip, other factors held steady. There might be a twist in this line of linkage especially for lending in developing countries. Banks in these countries have very shallow avenues for investment such that the stock market acts as an active competitor for investments vis-à-vis loans and advances. In this circumstance, expectation might be that an increase in stock prices will attract funds away from loans in favour of incremental outlay on stock investments. Declining stock prices also weakens borrowers' collaterals held in equities, thus shrinking the demand for loans. Kim and Ramon (1994) evaluated stock prices and bank lending behaviour in Japan and found that changes in stock prices positively correlated with loans advanced, particularly, in the period after the loans market had been deregulated.

Mansor (2006) applied the VAR technique to discern the effects which stock market fluctuations could have on the volume of loans and whether bank loans propagate financial shocks to the real economy in Malaysia. The variables included were bank loans, stock prices, consumer

Table 1. Order of Integration.

Variable	\hat{R}	$gM2$	L^s	$D/K,$	$A,$	$Pbl,$	L/n	xrv	Si
Order of integration	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(0)	I(1)	I(1)

price index, Gross Domestic Product, Interest rate and exchange rate. The result indicated a positive response of bank loans to innovations on stock prices. However, there was no evidence of feed back from bank loans to stock prices. The latter finding led to the conclusion that bank health may depend crucially on the stock market, but that the attempt to invigorate the stock market through increased lending is futile. The other ancillary finding is that despite much hype on the currency mismatching of bank assets and liabilities, there seems to be no effect of exchange rate on bank loans. The exchange rate may only affect bank loans indirectly through its effect on stock prices and real output – which are dampened by currency depreciation.

To identify the under currents in the fluctuation of loan supplies, an alternate approach has emerged which links loan supply to macroeconomic shocks. Potential sources of macroeconomic shocks are exchange rate changes, interest rate fluctuations, changing monetary policy stance, financial market volatilities and fiscal actions of governments. Degirmen (2007) applied the vector autoregression (VAR) to determine that public borrowing in Turkey crowded out private loans. From a policy perspective, the lending view of monetary policy transmission is anchored on the hypothesis that reduction in bank reserves squeezes their loan making capabilities. Mbutor (2007) has documented that monetary tightening, signaled by an increase in the monetary policy rate, reduces bank lending in Nigeria. The outcome is explained by many factors including the divestment from loans and advances to investment in government securities and other short term inter bank outlets. Azis and Thorbecke (2002) show that positive interest rate and exchange rate shocks decrease both capital and loan growth in domestic banks relative to foreign banks in Indonesia.

Generally, the nature of the macroeconomic environment influences the lending behaviour of banks. A booming economy provokes expectations that future flow of income streams are assured, thus, encouraging demand and supply for loans. As asserted by Talavera et al. (2006), banks make out more loans during periods of boom and reduced level of macroeconomic uncertainty and curtail lending when the economy is in recession.

Studies focused on the effects which macroeconomic stability might have on the lending behaviour of banks in Nigeria have received limited attention. However, Somoye and Ilo (2009) in a recent study have indicated measures of macroeconomic stability- including changes in money supply, exchange rate and inflation- impact on bank loans only in the long run perspective: while in the

short run, the total deposit and capital base of banks play very important roles in influencing the ability of banks to make loans.

The mixed nature of outcomes of studies regarding the impact the stock prices and exchange rate dynamics might have on the lending pattern of banks lends necessity to this study of how bank lending in Nigeria reacts to exchange rate and equity price fluctuations. Asset prices, broadly defined, would have been more reflective of portfolio adjustments, but data are mainly available in high frequencies only on the equity front.

METHODOLOGY

Data properties and Model Specification

Considering the temporal properties of the data series, the unit root test results, using the Augmented-Dickey Fuller statistic Table 1 show the order of integration below. The Augmented Engel-Granger test on the residual from the equation shows a long run relationship among the variables so that irrespective of the different levels of integration, the regression of the variables produces meaningful results.

Contemporary literature utilizes the Vector Auto Regression (VAR) to trace out the isolated impact of shocks to variable on the economy. VAR allows for simultaneity in the interaction of included variables in a system and provides a platform for the isolated impact of each variable to be identified. A VAR model is usually specified in terms of vectors and typically takes the form:

$$Z_t = r + \hat{K}_1 Z_{t-1} + \dots + \hat{K}_k Z_{t-k} + \beta X_t + e_t \quad \text{----- (1)}$$

For t = 1, 2, 3 ---- T,

where Z is a vector of endogenous variables and X is a vector of exogenous variables \hat{K} and β are fixed (n^*m) and (n^*m-1) matrices of parameters, respectively. r is an (n^*1) vector of constants and e_t is the stochastic error term with zero mean.

The model follows the specification in the study by Baum, Caglayan and Ozkan (2005) which links loan behaviour of banks to two sets of vectors, one tracking the impacts of localized factors on lending behaviour of banks. While the second captures effects from the macroeconomic environment.

$$L^s = \beta X_t + \hat{g} Y_t \text{----- (2)}$$

L^s measures deposit money banks' lending behaviour and proxied by loan to asset ratio of banks in the sample period as applied by Somoye and Ilo (2009); X_t is a vector of endogenous variables and includes factors local to banks which determine their abilities to make loans irrespective of the nature of the macro economic environment. These variables comprises of Total Asset size, A. Banks' deposit to capital ratio – D/K, measures the extent banks' depend on customers' deposits for their transaction. Thus, the higher this ratio the more the ability of banks to make loans: Loans to capital ratio –L/K, measure risk exposure. Generally the more banks' capital lean on equities the greater the chance of banks

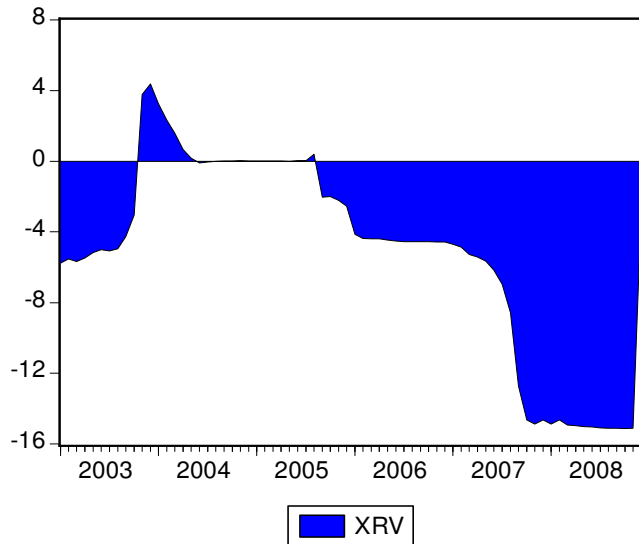


Figure 2. Computed exchange rate volatility.

making greater loans. However, this ratio is often guided by the single obligor limits set statutorily:

- (1) Provision for bad loans – Pbl, shows how much of income that is set aside to cover potential losses in the event of contract default. This is applied ex post. The higher Pbl the lower the fund base for making loans.
- (2) Ratio of loans to other investments – L/n, captures the extent of substitution between the choice to make loans and the attraction to other investment outlets. In the Monetary Survey of the Central Bank of Nigeria, banks' investment includes ordinary shares, preference shares, debentures, subsidiaries and other investments.
- (3) β is the parameter for the endogenous factors. $Y_{t is}$ is the vector of exogenous variables including macroeconomic indicators which define the environment in which loans are advanced. This is composed of
- (4) Growth of money supply – gM_2 , indicates that volume of loans made by banks reflects relative liquidity in the economy.
- (5) Inflation rate – \dot{r} , gauges overall macroeconomic stability as Olaniyan (2000) has shown that inflation and its variability are part indicators of macroeconomic instability in Nigeria.
- (6) Exchange rate volatility – xrv, measures volatility of the nominal naira exchange rate vis-à-vis the US dollar. The parameter associated with this variable is one of the centre points of this study as it provides the external impulse to the lending environment.
- (7) Equity price Fluctuations – si, measures the changes in the price of equities in the Nigeria Stock Exchange Market. It is proxied by month on month growth of the All Share Price Index. This variable is key for banks' loans decisions in three senses. One banks account for over 60% of total market capitalization of the Nigeria Stock Exchange Market. Two, equity investments accounted for an average of 47% of total investments by banks (excluding loans and advances) in the sample period. In fact, in September 2006, banks equity holding as a ratio of total investments was 73%. Three, in the regime of high returns in the Nigeria Stock Exchange Market banks' customers obtained loans for purchase of shares. Thus, a positive relationship between quantity of loans and price fluctuations can be set.

Thus, the estimated model is:

$$L^s = \beta (A, D/K, L/K, Pbl, L/n) + \hat{g}(gM_2, \dot{r}, xrv, si) + \epsilon_t$$

Measuring exchange rate volatility

There are several measures of volatility including standard deviations and percentage changes. Somoye and Ilo (2009) derived instability of the exchange rate as the percentage annual changes over its previous year's level and noted that the banker cannot determine the changes in exchange rate 'ahead but believes that such changes play a major role in the success or profitability of his credit extension in any particular year' The approach was suitable because the study involved annual data. However, because this study uses high frequency (monthly) data from 2003:1 to 2008:12, adopting this measure of volatility might not capture the actual permutations that go into making loans decisions – the tenor of loans, the exchange rate risk and the business cycle. Also, applying simple standard deviation will seem to convey the impression that exchange rate variations are linked mechanically to loan advances.

Therefore, we suggest an alternative measure of volatility to reflect actual loan making processes. Assumptions are that (1) The banker has sufficient skill in packaging loans (2) He understands the business cycle of his customers (3) He makes decisions about loans based on past experiences (4) He factors exchange rate in his decisions – knowing the past trends but not able to predict the future part with precision.

From (4), banks should be more stable in loan decisions when exchange rate volatility is low and alter their plans more frequently when exchange rate is very volatile.

So, the first step is to identify from the data series when exchange rate was most stable. We identify six episodes of exchange rate stability. January to August, 2003; June 2004 to July, 2005; September to December, 2005; January 2006 to January 2007; February 2007 to May 2007; March 2008 and November 2008.

Of the episodes, June 2004 to July 2005, (Figure 2) was the most stable with a standard deviation of 0.03 followed by February to May, 2007 with a standard deviation of 0.33. Thus, deposit money banks acted most 'normally' in their loan decisions in this episode of the sample period. Second step is to obtain the average of the exchange rate over the stable period, June 2004 to July, 2005 and compute the deviations from this mean for all the months in the series. Third step derives exchange rate volatility from the monthly nominal change of exchange rate deviation.

The data are sourced from the Central Bank of Nigeria's Monetary Survey and covers all banks in Nigeria. Deposit money banks' assets and provision for bad debts enter the model in logarithmic forms. The ordering of the variables in the model follow the standard Cholesky decomposition which is based on the length of time it will take for each variable to respond to extraneous shocks. Inflation can be seen as final effect of economic interactions after output. And stock prices change faster than exchange rate. So technically speaking, this involves identifying the effects of exchange rate volatility and equity price fluctuations by taking the residual from the reduced-form exchange rate and equity price equations and regressing them respectively, on the residuals from the other variables' equations with the aim of recovering the underlying structural shocks by recursive orthogonalization.

EMPIRICAL RESULTS

The impulse response analysis of exchange rate

Exchange rate is expressed in units of naira vis-à-vis the US dollars so that an increase in the exchange rate implies depreciation of the naira. The impulse response analysis shows a one standard deviation innovation on exchange rate has no immediate effect on the lending

behaviour of banks. This is justifiable because exchange rate changes do not necessitate recalling existing loans. At best the effects can only be priced into new contracts. From the second month to the 7th after the innovation on exchange rate, banks reduce the loan advances by an average of 0.002%. In the 8 to 10th month, the rate of decline increases marginally to 0.003%. The decline in loans is consistent with expectations because naira depreciation will increase the cost of servicing foreign liabilities. This would reduce the funds available for other transactions including loans. Exchange rate depreciation increases domestic inflation. From the results, inflation increased by 0.7 and 0.5%, respectively, in the 2nd and 3rd months. One implication of this is that the inflation effect would increase interest rates and thereby influencing demand for loans south. Evidence from actual data reveals that exchange rate depreciation/appreciation reduce/increase the quantity of loans advanced after 90 days, pointing that the average tenure of deposit bank loans is 3 months. However, the size of the impact of exchange rate volatility on bank loans is so insignificant and does not reflect popular notion about the exposure of banks in Nigeria to foreign exchange risk especially during the recent crisis. Actual data show that large exchange rate volatilities do not alter the loan to asset ratio of banks significantly. This finding is similar to the results posted by Somoye and Ilo (2009) for Nigeria, in the short run, and Talavera, Tsapin and Zholud (2006) for Ukraine.

The effect of naira depreciation has a dampening effect on the Nigerian stock market. The results indicate that the innovation on exchange rate immediately depresses the all share index by 0.08%. In the second month the index further drops by 0.27%. However, the trend is reversed from the 4th month. The result also shows that banks engage in active portfolio switching in the face of exchange rate fluctuations as the shock on exchange rate induces a decline in the loan to other investments ratio. In the 2nd and 3rd months the average rate of substitution was 0.35%. Money supply has an unexpected response to the innovation on exchange rate. It fell by 0.6 and 0.8% in the 2nd and 4th months. Depreciation of the naira should increase the number of naira per unit of US dollars, and since the main driver of money supply is the foreign asset, broad money should have increased.

Impulse response of equity prices

The lending behaviour of banks in the face of increases in equity prices is traced by a one standard deviation innovation on the all share price index. As expected, banks do not alter their loans portfolio contemporaneously with an increase in stock prices (Figure 3). After 30 days of the innovation on equity prices the volume of loans advanced by banks falls insignificantly by

0.004%. The same rate of decrease is sustained in the 3rd month, but decelerates to 0.001% in the 4th month. Beginning from the 5th month until the 10th month, the innovation on equity prices has a positive impact on bank loans. However, the level of impact is as infinitesimal as that of the negative impact 90 days after the innovation – on average not growing above 0.002%. This finding is somewhat puzzling for the Nigerian situation – a near neutral effect of stock price changes on bank loans? The opinion, albeit no-empirical, held in most quarters is that the boom in the stock market had caused the proportion of banks' assets committed to loans to surge. To make an informed inference, it is instructive to evaluate actual data on bank loans and equity price changes.

We identify periods of steep fall and sharp rise in the all share index and compare the response of banks' loans decision. In August 2003, the index rose 10.5% over the preceding month. Bank loans to asset ratio grew by 1 percentage point, to 34% in September, 2003. The lag effect of this after 90 days was also a rise of the same 1 percentage point in November 2003. In October 2003, the index also rose by 13.6% while bank loans fell by 1 percentage point in the same month but had no lagged effect whatsoever. On the other hand, the stock index fell by 12.2% in August 2004 and banks did not change the loan to asset ratio until November, 2005 when it (the ratio) fell by 1 percentage point. Generally, actual data confirm empirical findings that changes in equity prices is almost neutral in the loans' decision kit of banks, at least within the sample period.

The positive innovation on the all share index depresses the loans to investment ratio by an average of 0.38% in the 2nd and 3rd months. This confirms earlier report that in the corresponding periods banks initially actually divest from loans when stock prices rise but do not exactly increase investment in stocks. In the 5th month after the shock on equity prices the change in loans to investment ratio turns positive, and this period coincides with when banks begin to adjust the loan portfolios to reflect the lagged impact of equity price changes. From these, inference is that there is an investment outlet, not listed or better put, might not have been properly classified in the monetary survey in which banks divest into in the face of stock market. Under the investment line in the document, commercial papers, bankers' acceptances and loans under lease have combined value more than all investments put together. However, it is not clear, or needs to be evaluated whether those are possible competing investment outlets.

The innovation on equity prices does not affect exchange rate immediately. In the second month, exchange rate depreciates by 0.16%. However, beginning from the 3rd month exchange rate appreciates strongly, reaching up to 1% from the 6th to the 9th month. This result appears consistent with expected outcome. Immediately after the rise in the all share index, domestic investors who hold assets in foreign currencies

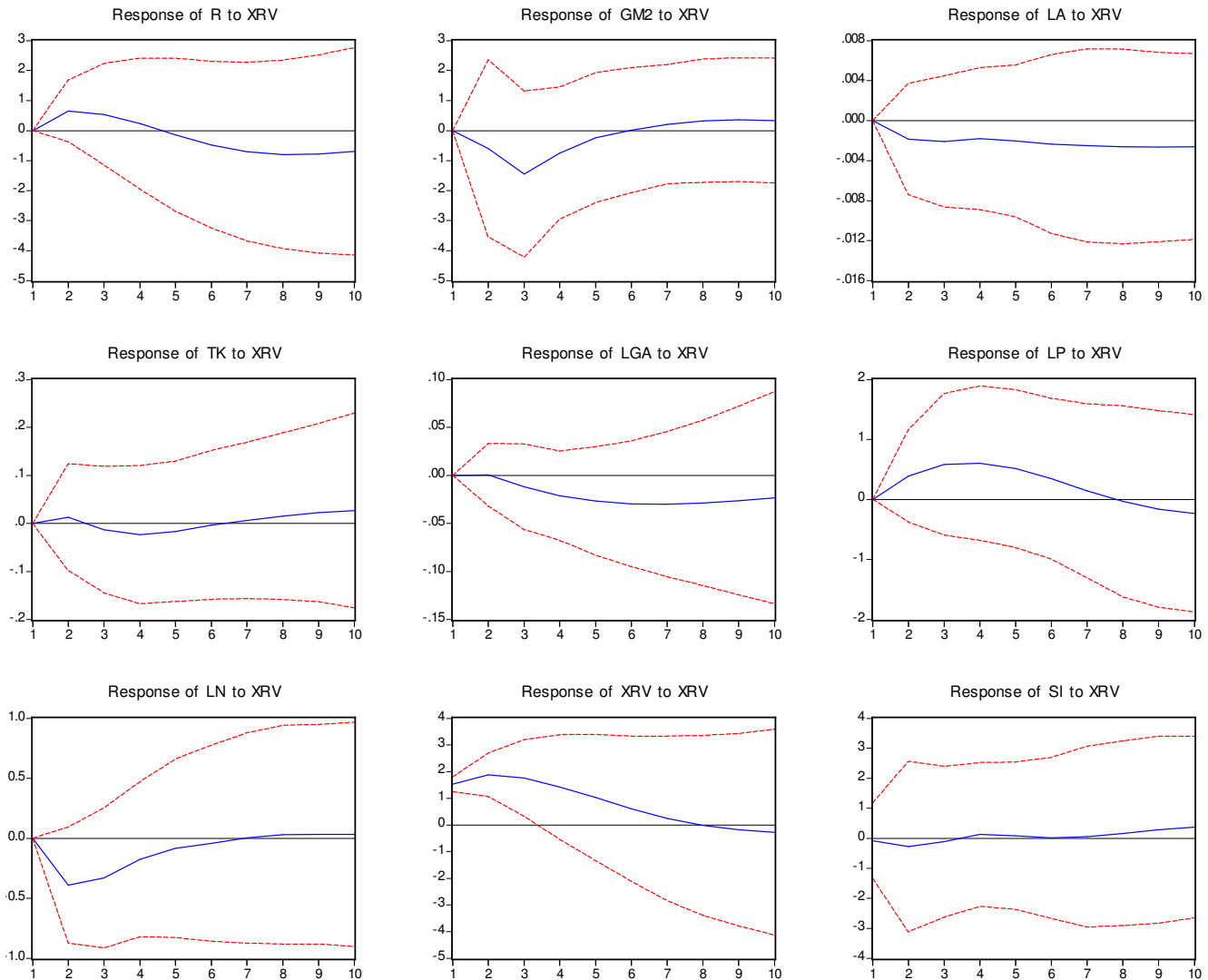


Figure 3. Response to cholesky one S.D. innovation $2\pm$ S.E.

would tend to divest into the stock market and reducing demand for the dollar, so leading to the observed depreciation (Figure 4). However, in the medium term, since the stock market is a mirror of general economic outlook, net foreign inflow from abroad on account of the boom, would increase demand for the naira and more than compensate the earlier domestic investor's reaction and so the exchange rate begins to appreciate. Comparing the relative effects of exchange rate changes on stock prices and vice versa, it is observed that the exchange rate volatility has a stronger and immediate effect on equity prices. However, Granger Causality test (Table 2), with 4 lags show that the line of causation between equity price fluctuations and exchange rate volatility originates from the all share price index.

For bank loans and equity price fluctuations Granger causality starts from loans confirming the popular view

that the reduction in the volume of loans (margin loans) partly account for the lull in the Nigerian Stock Exchange Market. However, between exchange rate volatility and quantity of loans, there appears to be no apparent line of causality, with the chosen 4 lags. This further confirms that the link between exchange rate volatility and bank lending behaviour in Nigeria is at best remote.

Variance decomposition of loans

This shows the relative contribution of various variables to the lending behaviour of banks. The result (Table 3) shows that in the first period, inflation rate and growth in money supply contribute 2 and 1%, respectively, to changes in bank lending behaviour. The rest was accounted for by the size of loans. After 60 days, inflation

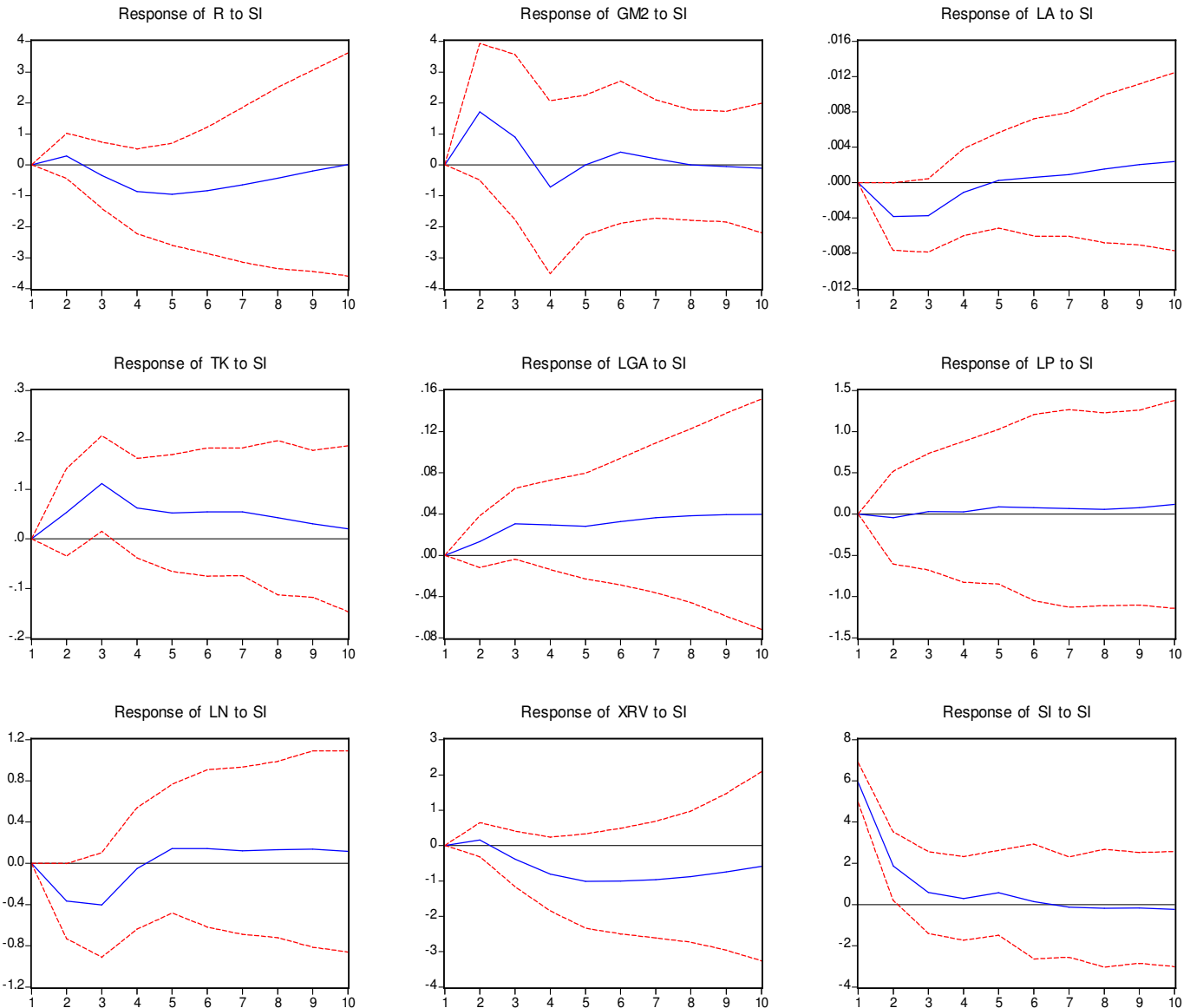


Figure 4. Response to cholesky one S.D. innovation $2\pm$ S.E.

Table 2. Granger causality tests.

Null hypothesis	Obs	F-Statistic	Probability
SI does not granger cause XRV	68	4.92058	0.00172
XRV does not Granger cause SI		0.89028	0.47551
Null hypothesis	Obs	F-Statistic	Probability
SI does not granger cause LA	69	1.13233	0.34300
LA does not granger cause SI		4.03455	0.01097
Null hypothesis	Obs	F-Statistic	Probability
XRV does not granger cause LA	68	1.00653	0.41147
LA does not granger cause XRV		1.87791	0.12627

Table 3. Variance decomposition of lending behaviour of banks.

Period	\check{r}	$gM2$	L^s	D/K_t	A_t	Pbl_t	L/n	xrv	si
1	1.9	0.62	97.4	0.00	0.00	0.00	0.00	0.00	0.00
2	5.7	0.55	82.2	1.31	0.79	0.03	0.67	1.63	7.06
3	14.7	0.74	65.7	2.51	0.9	0.89	1.02	2.84	10.57
4	21.2	0.77	56.7	3.87	1.08	2.40	1.14	3.43	9.36
5	25.6	0.70	50.38	5.13	1.24	3.46	1.17	4.13	8.21
6	28.31	0.63	45.4	6.19	1.46	4.18	1.29	5.04	7.44
7	29.8	0.58	41.7	7.31	1.64	4.43	1.45	6.03	7.02
8	30.2	0.54	39.0	8.29	1.78	4.47	1.63	7.05	7.05
9	29.9	0.52	36.82	9.04	1.91	4.4	1.81	8.07	7.49
10	29.2	0.52	35.2	9.63	2.03	4.24	2.00	8.98	8.22

still has a strong effect at 21%, while loans to capital ratio and loan loss provisions bring on 4 and 2.4% respectively. The asset size of banks only accounts for 1.1% in this period and never contributed above 3% to total changes in lending behaviour of banks. Inflation and the deposit to capital ratio remain very noticeable variables until the 10th month.

Exchange rate volatility contributed an average of 2, 4 5.5 and 8%, respectively for the periods 2nd - 3rd, 4th – 5th, 6th – 7th and 8th – 10th. The highest contribution of the all share price index was 10% in the 3rd month, while the average contribution was lower than 10%. This result further confirms that the duo of exchange rate volatility and equity price fluctuations, though have effects on the lending behaviour of banks, such effects are not as significant as popularly held.

Conclusion

The study aimed to ascertain the impacts of exchange rate depreciation and equity price fluctuations on the lending behaviour of banks in Nigeria. It also identifies the link between exchange rate and the all share price index. The VAR methodology was applied. The results show that exchange rate volatility and stock price fluctuations do affect the lending behaviour of banks, but very insignificantly. Exchange rate volatility has a relatively stronger effect on the all share index than the reverse. However, the line of causality flows from equity prices to exchange rate. Also, Granger causality test showed that the decline in the volume of loans by banks, partly contributed to the lull in equity prices. However, between exchange rate volatility and quantity of loans, there appears to be no apparent line of causality.

The analysis of variance shows that inflation and deposits to capital ratio were most important factors that affect deposit money banks lending behaviour in Nigeria. The sheer size of assets was found not to be a significant consideration in the lending behaviour of banks.

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