

Asset Prices, Credit Growth and Monetary Policy in Nigeria

Ukpai Kama, Dinci J. Yilkudi and Hannah Ukeje

Abstract

This paper contributes to the debate on the monetary policy transmission mechanism in Nigeria. The paper explores the impact of monetary policy on credit growth and whether these credit developments are capable of influencing asset prices (stock prices) in the Nigerian economy. Using VAR model spanning annual data from 1986 to 2012, the impulse response functions revealed that the relationship between asset prices, captured by the All-Share Index, and monetary policy, is not direct, but operates mainly through the response of inflation to the key monetary aggregate. A positive shock to money supply growth would raise credit and inflation, which would then induce growth in asset prices.

Keywords: Monetary Policy, Credit Growth and Assets Prices, Vector Auto regression

JEL Codes: E58, G28

Authors' e-mail: ukama@cbn.gov.ng; djyilku@cbn.gov.ng; and hnukeje@cbn.gov.ng

I. Introduction

Increased and sustained growth in credit and asset prices without a counter part real growth as its base played an important role in provoking financial instability in many countries. In the past, efforts had been focused on the identification of asset-price bubbles and whether monetary policy should respond to them. Recent arguments appear to be shifting towards how monetary policy reacts to changes in asset prices. The underlying intuition is that an asset price increase which is driven by a substantial rise in credit growth can result in negative spill-overs and complicate monetary management (Gjedrem, 2003).

Although it is normal for the objectives of monetary policy to differ from country to country, depending on their economic conditions, its effectiveness lies largely on the transmission process through which variations in central bank's policy actions impact on the economy, especially output and prices. These channels of transmission mechanism are well documented in the literature and include interest rate, exchange rate, credit, asset prices and inflation expectation channels.

The use of instruments such as the cash reserve and liquidity ratios in influencing banks reserves, for instance, provides the monetary authorities the leeway to manage liquidity and hence the money creating abilities of banks. Also, the use of open market transactions moderates the real quantity of deposits in the banking system. Thus, monetary policy affects both the short-term interest rates and aggregate demand through its ripple effect on credit creation.

Most studies, particularly in developing economies (including Nigeria) consider asset prices to comprise, largely, equity prices, while other asset prices, such as properties are rarely captured. Thus, equity prices and stock market index are considered as appropriate proxy for asset prices in developing countries. This is not only due to the paucity of data, but also the rudimentary nature of the property markets in these economies. Similarly, most empirical studies have established relationships between equity prices and macroeconomic variables such as interest rate, inflation rate, money supply and exchange rate.

In Nigeria, like in most developing countries, the property market development is still shallow. Such shallowness implies that money creation, resulting from rapid credit growth may not be matched by an increase in the demand/supply for housing. Prior to the 2004 bank consolidation programme, stock prices seemingly had no impact on the Nigerian economy. Reforms in the financial sector have gradually increased awareness of the sub-sector and increased the importance of stock prices in the economy as banks access the stock market more than before to raise the required minimum capital. For instance, the total market capitalisation of the Nigerian Stock Exchange (NSE) peaked at N13.3 trillion and constituted 58.2 per cent of GDP at end-December 2007, as against N1.3 trillion recorded at end-December 2003 (13.1 per cent of GDP), CBN (2007). Similarly, the all-share index of the NSE, a barometer for measuring the performance of the market, grew from 163.80 in 1986 to 12,137.70 and 28,078.81 in 2002 and 2012, respectively.

These structural shifts and developments blur the understanding of the assets price, credit growth and monetary policy relationship as studies in other jurisdictions explaining this relationship has shown. The purpose of this research agenda is, therefore, to empirically establish the relationship between monetary policy, credit growth and asset (stock) prices in Nigeria. In this regard, we estimate a VAR system to examine the response of asset (stock) prices and credit growth to monetary policy shocks. The analysis also entails an investigation of the causality among some other macroeconomic indicators that would aid in this investigation.

The rest of the paper is organized as follows: section two focuses on the review of related literature. Section three presents trends in equities, some macroeconomic variables and other credit markets in Nigeria, while the methodology of the study is considered in section four. The empirical analysis and results are examined in section five, while the policy implications and conclusion are contained in section six.

II. Literature Review

II.1 Theoretical Background

When a central bank takes a monetary policy action, it sets in motion a chain of economic events. This chain of events, which links a change in monetary policy to variations in prices and output, is what is called transmission mechanism of monetary policy (CBN, 2010). In the literature, the identified channels of monetary policy include: interest rate; exchange rate; asset prices (bonds, stocks and real estate prices); credit and expectation.

II.1.1 The Interest Rate Channel

The oldest transmission channel is the interest rate channel, propounded by Keynes (1936). In the view of Keynes, the effect of monetary policy is transmitted to the rest of the economy through the interest rate. The process operates through the short-term interest rates (overnight, one week and one month rates) and shocks in these rates are transmitted to the medium and long-term interest rates.

According to the Keynes' liquidity preference theory, the nominal interest rate is a function of the demand for and supply of money. Therefore, unless inflation affects the demand for and supply of money, the expected nominal interest rate must remain unchanged irrespective of the inflationary expectations in the economy. This had established a link between inflation and interest rates. Accordingly, a rise in inflationary expectations will lower the real rate of interest. In the liquidity preference theory, the real rate measures the inflation-adjusted return on bonds. This, however, does not stop with bonds. Inflationary expectations often also lead to increase in the prices of mortgages and stocks. As the prices of stock and real estate rise, bond prices fall. According to the liquidity preference theory, this process will continue until an equilibrium level is reached by the returns on bonds, mortgages and stocks. The development may, therefore, trigger lower expected rates on each of these assets. This is the nexus among stock prices, interest rates and inflation from Keynes view, Mc Grave-Hill (2006).

II.1.2 Credit Channel

The credit channel of monetary policy influences aggregate demand and output directly. This is based on the proposition that the major source of funds for business activities comes from bank loans, and that there is no alternative for bank loans for funding business activities in the economy. Also, the central bank is assumed to be in a position to contract banks' ability to lend to the investing public. Thus, it is assumed that tightening or expansion signals in monetary policy would affect business activities negatively or positively. The credit channel is summarized below:

Contractionary Monetary Policy: Supply of Bank Loans (Reduce) Investment (Reduce) Aggregate Demand (Reduce) Output (Reduce) Employment

II.1.3 The Asset prices Channel

Mishkin, (2001) in his work on monetary policy transmission mechanisms through the stock market identified three main channels of effects. According to them, under the Tobin q framework, if q , (the market value of firms replacement cost of capital) is high, then firms could source funds through the issuance of stock and get a high price for it, compared with the cost of facilities and equipment they were to purchase for increased investment. In this regard, a lax monetary policy tends to make bonds less profitable thereby raising investors' interest for stocks. The development would drive up stock prices, q , investment and aggregate demand leading to increased inflationary pressures in the economy. The increased stock prices implies reduced cost of capital for firms' operations as each share issued produces more funds.

In analysing the balance sheet approach, the authors stated that expansionary monetary policy measure leads to increases in firms' net worth through increase in the price of stocks, which may result to reduced adverse selection and moral hazard effects. The development leads to increased lending activities and hence increased investment and aggregate demand in the economy.

According to the authors, the balance sheet effects also work through household liquidity effects where increases in price of stocks necessitated by lax monetary policy transmits into the value of financial assets with the resultant increase in consumer expenditure and residential housing spending.

However, Cecchetti et al. (2000) had argued that asset prices were too volatile to be of much use in determining monetary policy as its equilibrium value was not known. They were of the opinion that asset prices misalignments were almost impossible to identify and correct, and that systematically reacting to asset prices might prove to be threatening. They, therefore, concluded that monetary policy

measures should not be directed towards the build-up of asset price bubbles, but rather should react more quickly and forcefully to the bursting of the bubble.

In the same line of argument, Bernanke and Gertler (2000, 2001), asserted that asset prices become relevant only to the extent that they might act as an indication for the central bank's forecast of inflation and provide useful information about the performance of the economy. According to them, once the predictive ability of asset prices for inflation has been achieved, there should be no additional response of monetary policy to asset price fluctuations. They observed that monetary policy was a necessary but not a sufficient tool to curb the potentially negative effects of booms and busts in asset prices. The authors, therefore, suggested the enhancement of legal and regulatory frameworks, as well as prudent fiscal policies, which were also identified to be fundamental in insulating an economy from financial disturbances.

Gilchrist and Leahy (2002), had, however, cautioned that the fact that asset prices did not give detailed information relating to output and inflation does not imply they had no relationship with output and inflation. In effect, most of the asset measures were correlated with output and inflation. They concluded that since asset channels were the same as aggregate demand channels, they tended to raise both output and inflation.

Leijonhufvud (2007) had asserted that expansionary monetary policies could create asset price inflation, thus suggesting that central banks' neglect of the impact of asset prices could be detrimental to the economy. According to him, an expansionary monetary policy would lead to asset price inflation and deterioration of credit.

Saxton (2003) was also of the opinion that asset prices could reflect price bubbles since they influenced and assisted in predicting general price inflation. He therefore suggested the incorporation of asset prices as a far-reaching measure of inflation and should form a component of monetary policy formulation by central banks.

Borio and Lowe (2002) observed that prolonged credit growth coupled with excessive increases in asset prices has the tendency of causing financial crisis in an economy. They maintained that though low and stable inflation engenders financial stability, there was that probability that increased demand pressures also showed up first in aggregate credits and asset prices, rather than in goods and services prices. The authors were, therefore, of the view that monetary policy response to credit and asset prices might be appropriate to engender both financial and monetary stability. Establishing some stylized facts on the behavior of asset prices for over thirty years, they came to the conclusion that there was a

nexus between asset price movements, credit cycles, and developments in the real economy. The author further noted that excessive credit growth alone might not constitute much source of destabilization to the financial system. According to them, a combination of events, including excessive credit growth, significant rise in asset prices and massive investment posed potential problems. They, therefore, concluded that monetary policy should be concerned with a mix of events in the financial and real economy that exposed the financial services sector to a significantly increased level of risk, rather than worried about the existence of a bubble in a given asset price.

II.1.2 Empirical Literature

Literature is replete with empirical works on credit growth, asset prices and monetary policy. Goodhart et. al (2005), employing a multivariate modeling approach, analyzed the relationship between bank lending and aggregate asset prices in 18 industrialized countries based on a VAR model. They found the causality between asset prices and the ratio of credit to GDP to be bi-directional and reinforcing, and both were significant in explaining bank credit risk. The study established a link between asset price fluctuations (but property market was stronger than equity prices), credit to the private sector and the real economy in general.

Bernanke and Kuttner (2005) constructed a measure of surprise rate changes to determine the reaction of equity prices to monetary policy actions. The authors observed that the reactions from the market were fairly strong in favour of the surprise funds rate changes. The outcome of the unanticipated rate cut generated an instantaneous increase in stock prices, and was attributed to a prolonged era of lower-than-normal surplus earnings. They also discovered that a 1.0 per cent surprise rate rise would result in a stock market fall of about 5.0 per cent and concluded that there was a relatively robust and dependable reaction of the stock to unpredicted monetary policy actions.

Investigating the link concerning credit to GDP ratios and aggregate asset prices for a huge sample of developed countries spanning 1970–92 (22 years), Borio, et. al. (1994) hypothesized that the growth of credit situations as measured by credit to GDP ratio might aid to explicate the growth of aggregate asset prices. The study showed that the inclusion of credit to GDP ratio to an asset pricing model improved the fit of the equation in most countries. They found that the boom-bust cycle in asset markets of the late 1980s and early 1990s, based on some simulations, would have had little or no impact if the credit ratios had remained constant.

Allen and Gale (2000, 2003 and 2007) had, in their study, indicated how a risk shifting problem in the banking system could result into asset bubbles in an economy. They observed that credit growth work together with risk shifting in two dimensions. First, credit growth affects asset prices concomitantly via encouraging the funding of risky investments at the current date. Also, anticipation of future credit growth could cause a rise in the current price of assets, which might lead to crisis in the economy. The initial edition of the model indicated how asset prices were correlated with the amount of credit, in addition to how doubt about asset payoffs could result into crisis due to risk shifting. In effect, the default and the resulted crisis were attributed to low payoffs to risky assets. A dynamic model was equally developed for the second edition and the future levels of credit were assumed to be important determinates of asset prices. Similarly, default and crisis emanated from the measures taken by the central bank rather than from the real economic variables. The last edition of the model indicated how anticipated credit growth could cause financial fragility, as a crisis could only occur when the realized credit growth was adjudged to be significantly large. This implies that a financial squeeze was not needed to burst the bubble.

A study by Cecchetti (2006) gave a fascinating reason as to why central bankers ought to take asset prices into consideration in their monetary policy measures. The empirical evidence indicated that mortgage and stock price booms enhanced the risk of adverse macroeconomic outcomes occurring in a sample of selected advanced economies, whose price-level and output gaps were characterized by so-called 'fat tails' (one in which the probability of being in the tail of bad outcomes, for example, was higher than if the distribution were normal). Therefore, if asset price booms fall into the tail of bad outcomes of a distribution, the existence of such 'fat tails' would worsen the losses expected from the asset booms and that might have potentially impact on monetary policy.

Eichengreen and Arteta's (2000) in a study found that a 1.0 per cent rise in domestic credit has the chances of causing banking crisis in the following year by 0.056 per cent. In a similar study by Collyns and Senhadji (2001), using a panel data from four East Asian economies (Hong Kong, Korea, Singapore and Thailand), found that credit growth had a significant concurrent impact on residential property prices and, therefore, came to the conclusion that credit growth by banks had contributed meaningfully to the real estate bubble in Asia before the advent of the 1997 East Asian crisis.

Generally, the relationship and interaction between equity market returns and other macroeconomic variables has been researched extensively in the

literature. Chen et al (1986) in an investigation of the long-run relationship between equity prices and other variables in the US, found that unanticipated inflation, risk premium, industrial production and yield curve can explain stock price behavior, especially during period of high volatility. They also found that oil prices, market index and consumption in the US were not significant in the stock pricing mechanism.

In Nigeria, studies that have been done include Abraham (2011), Adaramola (2011), and Osamwonyi and Evbayiro-Osagie (2012), among others. In a multiple regression analysis, Amadi, Oneyema and Odubo (2002) found that relationship between stock prices and the macroeconomic variables (including inflation and money supply) are consistent with theoretical postulation and empirical findings in some countries. Soyode (1993) found that the macro economic variables (inflation, exchange rate and interest rate) that co-integrated with stock prices are consequently related to stock returns. As argued by Udegbonam and Oaikhenan (2002), when increase in money supply is not supported by corresponding output growth, inflationary pressure makes economic agent switch their wealth from financial assets to tangible assets with consequential effect on the movement of stock prices. Osamwonyi and Evbayiro-Osagie (2012) thus concluded that with this widely held view and given the explosive growth in the Nigeria's money supply, we expect stock prices to be adversely and significantly affected by changes in this variable.

In a related analysis, Ibrahim and Agbaje (2013) had argued that actual consequence (and by extension its effect on stock prices) of inflation depends largely on the degree to which it is anticipated. They added that where inflation is correctly anticipated and with an effective monetary authority in place, fluctuation in price would be managed effectively. On the other hand, where inflation is unanticipated, some economic agents will gain, while others will lose. Invariably, reduced demand for stocks and equities as financial wealth will be the effect of reduced savings which arises from the negative impact of unanticipated inflation. This decrease in demand causes the price of equities to fall thereby reducing returns on equities and stocks.

In a review of six carefully selected macroeconomic variables in Nigeria, Adaramola (2011) found that interest rate, exchange rate and international oil price exert strong significant influence on stock prices, while money supply, inflation rate and GDP exert weak influence on stock prices in Nigeria. Similarly, Osamwonyi and Evbayiro-Osagie (2012) evaluated the relationship between the macro-economic variable and stock market index in Nigeria. They found money supply, exchange rate, inflation and GDP to be strong determinants and

therefore recommend strong policy options for proper management of the variables.

Okpara (2010) analyzed the effect of monetary policy on the Nigerian stock market returns and found that monetary policy was a significant determinant of long-run stock market returns in Nigeria. Specifically, high Treasury Bill rate reduced stock market returns and thus, showed an evidence of monetary policy efforts to slow down the economy, while current and one period lag interest rate exerted a positive and significant influence on the stock market returns. The lagged error correction term was negatively signed, suggesting that about 32.0 per cent of deviation from the long-run equilibrium between stock returns and the Treasury bill rate cum interest rate was corrected periodically. Also, the salient feature of the variance decomposition results was that the predominant sources of returns fluctuations were due largely to stock returns shocks and interest rate shocks. It was suggested that the innovations of rate of interest could be a better predictor of stock market returns in Nigeria.

Igbinosa and Obayagbona (2012) worked on the Monetary Policy and Asset Prices: Empirical Evidence from Nigeria. Using the empirical methodology of vector autoregression (VAR), this study sought to determine the effects of monetary policy on asset prices in Nigeria. Quarterly data covering eleven-year period (1990 to 2010) were employed in the analyses. They found that monetary policy responded weakly to asset prices fluctuations (stocks and real estate) in Nigeria and that the effects of such response took long period before manifesting. In particular, the study further revealed that monetary policy action had more destabilizing effect on real asset prices than stock prices. They therefore recommended a broad reform in both the financial services and the fiscal sectors as changes in the monetary regime alone without support from the fiscal arm of the government are not likely to sufficiently address asset price fluctuations in Nigeria.

III. Trends in Equities, Some Macroeconomic Variables and Other Credit Markets in Nigeria

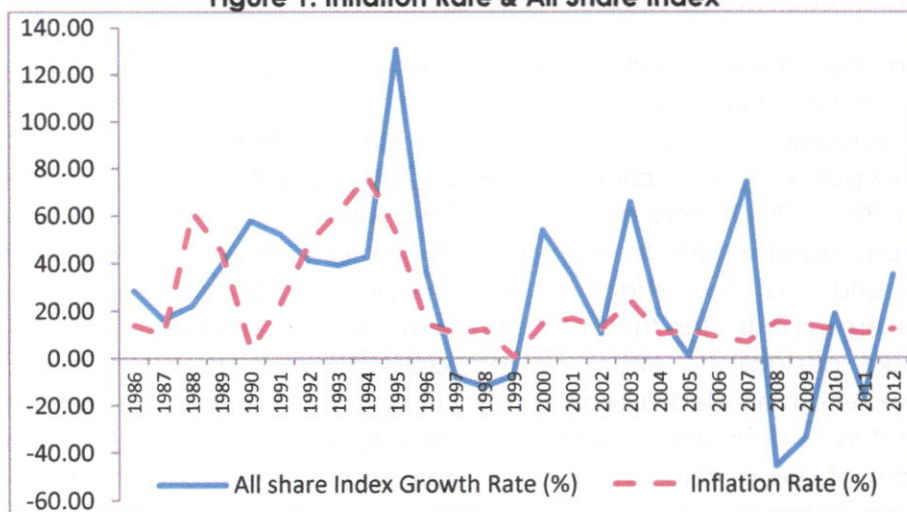
Attempts have been made by different schools of thought to provide a theoretical explanation regarding the behavior of asset prices. Widely held view among the theorists posits that stock value is determined by either the expectations of future earnings or largely by their preceding prices such that successive prices depend on each other. Other theorists have, however, held that stock prices follow definite pattern and, therefore, proposed formal model theories that generally explains asset price behavior (Maku and Atanda 2009). Most empirical studies have also established relationships between equity prices and macroeconomic variables such as inflation rate and money supply.

III.1 Trends in Inflation and Stock Prices

The link between assets prices and inflation lies in the impact of its changes on aggregate demand. Asset prices are generally important channels of wealth creation, thus, an increase in their prices brings about wealth appreciation, leading to a rise in aggregate demand. Also, asset prices, particularly housing, are affected by credit supply as they are financed through borrowing.

In Nigeria, the role of asset prices can be appreciated by looking closely at the trend in the ASI and inflation. From figure 1, a rise in inflation (1985 – 1998) lowered the ASI, while reduction in inflation rates brought about wealth appreciation (2002 – 2012). Generally, the ASI experienced remarkable increase over the years. In 1986, it stood at 163.80 and rose to 513.80 by 1990. The 1990s witnessed renewed boost in equities as evidenced by the growth in the ASI as well as the number of equities listed in the Nigeria Stock Exchange (NSE).

Figure 1: Inflation Rate & All Share Index



From 2000, the ASI recorded tremendous increase, particularly between 2005 and 2007 when it rose from 24,085.80 to 57,990.20. This rapid increase was, largely, attributable to the re-capitalisation drive reforms in the banking industry following the 2004 - 2006 bank consolidation exercise. The ASI, however, declined to 31,450.78, and further to 20,827.17 and 20,730.60 in 2008, 2009 and 2011, respectively, owing to the second round effect of the global financial crises 2007/2009. It stood at 28,078.81 in 2012.

III.2 Trends in Credits and Stock Prices

The relationship between credit and stock prices has been variously explained through its relationship with changes in the interest rate. According to Osamwonyi

and Evbayiro-Osagie (2012), an investor has to consider the level and growth in interest rates prevailing in the different sectors of the economy, and evaluate their impact on the performance and profitability of companies. In other words, a rise in interest rate depresses corporate profitability and also leads to an increase in the discount rate applied to equity investors and both have adverse impact on stock prices, and vice-versa. In a related study, Goswami and Jung (1997) found that stock prices in the Korea economy are negatively correlated with long-term interest rates and positively related to short-term interest rate.

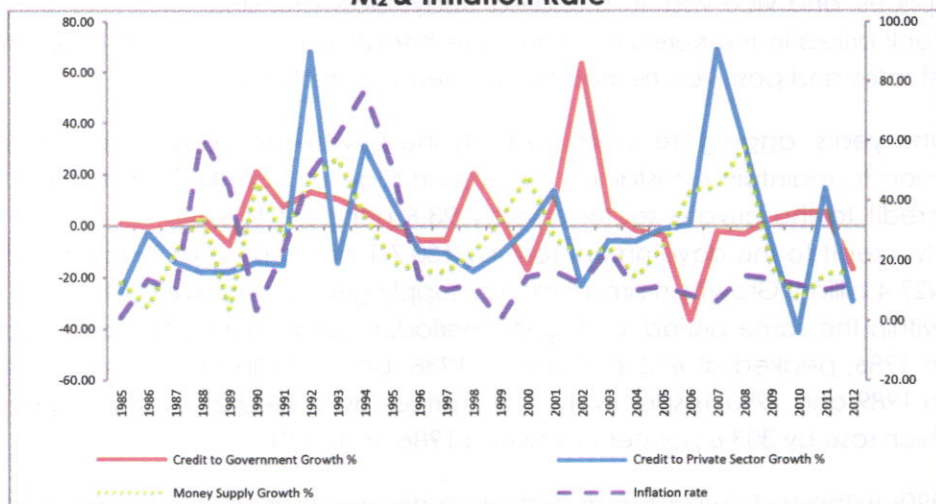
Over the years, aggregate credit to both the private and government sectors continued to maintain a sustained increase in Nigeria. From ₦18.3 billion in 1986, total credit to the private sector rose by 93.6 per cent to ₦35.4 billion in 1990. Similarly, credit to the government rose by 150.7 per cent to ₦68.7 billion in 1990 from ₦27.4 billion. Growth in broad money supply grew on an average of 20.7 per cent within the same period. During the period, inflation increased from 13.7 per cent in 1986, peaked at 61.2 per cent in 1988, before falling to 44.7 and 3.6 per cent in 1989 and 1990, respectively. Stock prices ascended as evidenced by the ASI, which rose by 303.6 per cent between 1986 and 1990.

The 1990s witnessed similar trends in aggregate credit, as growth in credit to the private sector continued to surge, while growth in credit to government fluctuated. Total credit to the private sector rose from ₦42.1 billion in 1991 to ₦596.0 billion in 2000, representing a growth rate of 1,316.4 per cent, while growth in credit to government fluctuated between ₦39.6 billion and negative ₦288.1 billion with an average growth rate of 29.6 per cent. During the period, broad money supply maintained an upward swing as it indicated an average growth rate of 31.8 per cent from ₦87.5 billion to ₦1,036 billion in 2000. Similarly, the rate of inflation averaged at 31.3 per cent during the review period. The ASI which stood at 783.00 in 1991 rose to 8,111.00 in 2000, with an average growth rate of 35.3 per cent.

Credit to the private sector continued to expand between 2001 and 2012. Total credit to the private sector rose from ₦855.0 billion in 2001 to ₦10,219,336.10 billion in 2009, and ₦15,151,762.15 billion in 2012. From 2001 to 2012, growth in total credit to the private sector averaged 33.1 per cent. In 2001, however, aggregate credit to the government was negative ₦6.0 billion. It rose to ₦373.6 billion in 2002, but was negative ₦3,107.7 billion in 2008. By 2012, it stood at negative ₦2,453.6 billion. Growth in M2 averaged 25.8 per cent during the same period, while the rate of inflation fluctuated between 6.6 per cent and 23.8 per cent. Stock prices (ASI) continued increasing from 10,963.10 in 2001 to 57,990.20 in 2007. However, between 2008 and 2010, stock prices witnessed tremendous decline, with the ASI falling sharply to 31,450.78 in 2008, and further to 20,827.17 in 2009 due to the

effects of the global financial crisis. By 2012, the ASI rose to 28,078.81, reflecting increases in stock prices.

Figure 2: Growth in Credit to the Private Sector, Credit to the Government, M₂ & Inflation Rate



Note: The actual figures for years 2002 and 2005 are 6320.8 and 732.81 per cent, respectively. These outliers were reduced to allow legibility of the chart.

IV. Methodology and Data Sources

IV.1 The Model

To be able to uncover the underlying relationship among asset prices, credit growth and monetary policy, we apply the unrestricted Vector Autoregression (VAR). While the VAR methodology has some limitations such as its inability to contain a large data set and it's a theoretical nature, we choose to exploit the information contained in the time series' historical path to analyse the behavior of asset prices in response to a monetary policy shock. We hinge the robustness of the outcomes on the appropriate lag order and stability of the VAR, which is an important property. The generalized form of the unrestricted VAR is of the form

$$y_t = \alpha_1 y_{t-1} + \dots + \alpha_n y_{t-n} + \varepsilon_t \quad \varepsilon_t \sim N(0, \Omega) \quad (1)$$

Where $y_t = n \times 1$ vector of observed variables and the $n \times n$ matrices of $\alpha_1 \dots \alpha_n$ coefficients, while Ω gives the $n \times n$ covariance matrix.

IV.2 Variables

The empirical VAR model contain broad money (M_2), all-share index to proxy asset prices, credit to the private sector to capture credit growth and inflation, rate of change of the price level. The variables are expected to help us achieve our objective of assessing how monetary policy shocks affect asset prices and credit growth, in particular and the general price level in the economy.

M_2 indicates prevailing liquidity conditions in the banking system and correlates with the monetary policy stance of the central bank. An expansion in money supply makes the banking system more liquid, improving the excess reserves of deposit money banks (DMBs), hence, the ability of banks to create credit. The reverse holds with a contraction in money supply. Increase in money supply, ($\uparrow M$) can raise the expected price level ($\uparrow P_e$) and hence, expected inflation ($\uparrow \pi_e$), thereby lowering the real interest rate ir ($ir = i - \pi_e$). This action will stimulate spending through the aggregate demand:

$$\uparrow M \rightarrow \uparrow P_e \rightarrow \uparrow \pi_e \rightarrow \uparrow I \rightarrow \uparrow Y$$

Conversely, monetary policy tightening raises interest rates and makes it more expensive to borrow for investment and consumption. This would cause a reduction in investment and consumption and thus, a fall in aggregate demand. The fall in aggregate demand would eventually reduce inflation in the economy.

$$\downarrow M \rightarrow \uparrow ir \rightarrow \downarrow I \rightarrow \downarrow \pi_e \rightarrow \downarrow Y$$

Generally, private sector is an important measure of opportunities for new firms as it enhances these firms to finance their projects rather than public than public sector funds. This is because the latter may not be based on the financial viability of the intended projects but may be based on political considerations, which in most cases do not result to any investment into any project at all. Thus, this study used the credit to the private sector to capture credit growth.

IV.3 Data Sources

The study used annual data from 1986 – 2012 largely from the CBN Annual Reports and Statistical Bulletins. The need to achieve consistency and minimize statistical and measurement errors informed our limiting the sources of data collection for this study. We are aware that high frequency data such as weekly, monthly and quarterly figures have their advantages, but they are often associated with errors and constant revisions, hence we used annual data series which are not fraught with errors and constant revisions. Therefore the choice of annual data in contrast to weekly, monthly or quarterly data series for this study is most appropriate.

The optimal lag length will be tested using a battery of information criteria including, Akaike Information Criteria (AIC), Schwarz Bayesian criterion (SC) among others.

V. Empirical Analysis

V.1 Unit Root Test Results

Intuitively, growth rates are log-first difference of the time series and should therefore, yield stationary series which is important for the stability of the VAR deployed for this analysis. For completeness, the unit root tests as shown in table 1 indicate that all the variables, namely the growth in all-share index (ASIG), growth in credit to the private sector (CPSG), inflation (INF) and growth in money supply (MSG) were stationary at level i.e. I(0).

Table 1: Results of unit root tests

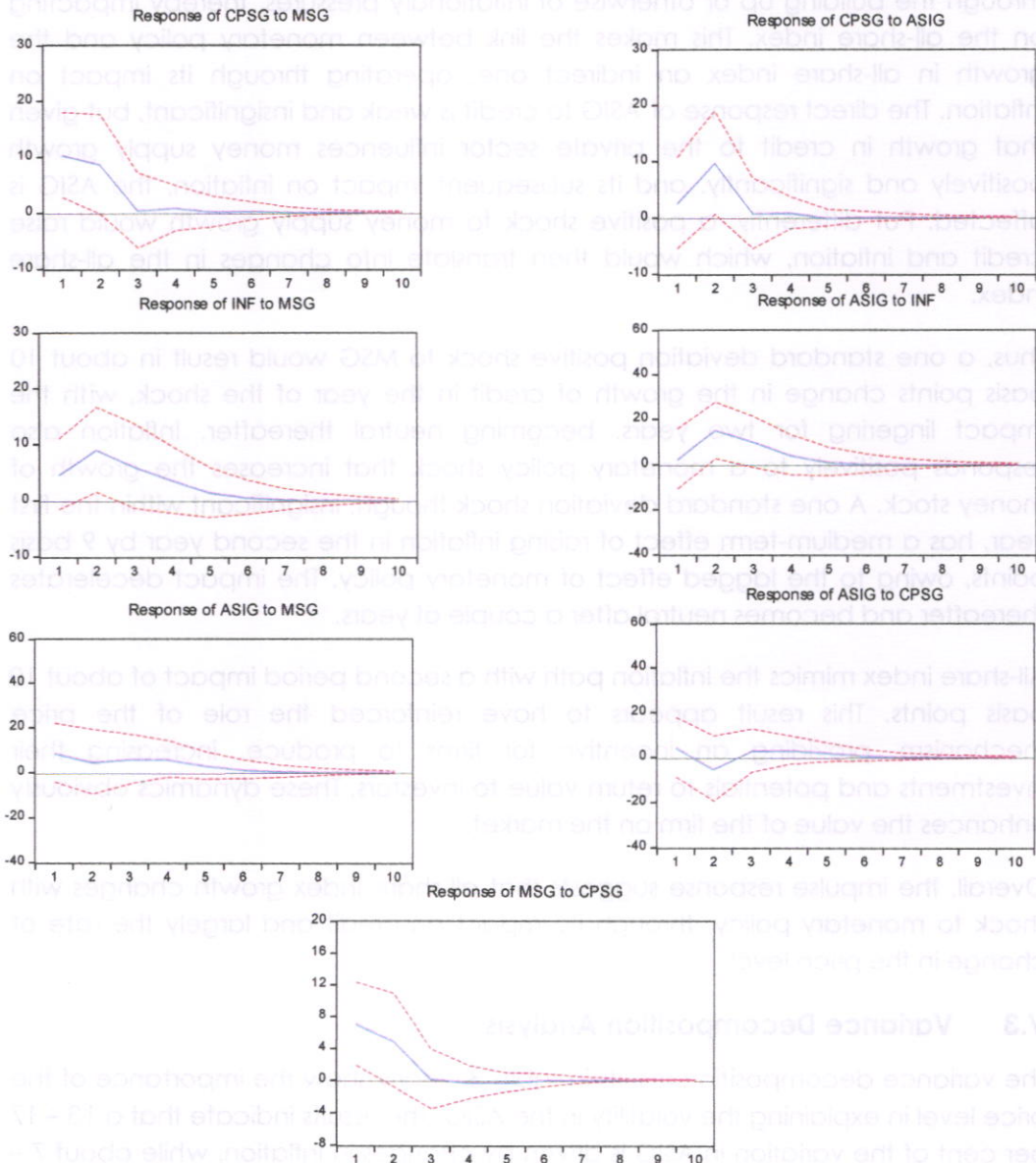
Variables Integration	ADF [k]	Order of
1 Money Supply Growth (MSG)	-3.631046[0]**	I(0)
2 Credit to the Private Sector Growth (CPSG)	-4.826248[0]*	I(0)
3 Inflation (INF)	-2.843139[1]***	I(0)
4 All-Share IndexGrowth (ASIG)	-3.969421[0]*	I(0)

Constant term included, while k is the number of included lags. For ADF test, critical value at 1%, 5% and 10% significance level are -3.699871, -2.976263 and -2.627420, respectively. * denotes statistical significance at 1% level. ** denotes statistical significance at 5% level. *** denotes statistical significance at 10% level. Further test using the Elliot-Rothenberg-Stock DF-GLS test shows inflation to be stationary series at 5% suggestive of its trend stationary.

Consequently, a four-variable VAR with recursive order MSG, CPSG, INF and ASIG was estimated with a view to assessing the generalized impulse response functions of all-share index growth, inflation and growth in credit to the private sector. The optimal lag length is one, while the VAR diagnostics are robust and satisfactory, reflecting its stability. In particular, the correlogram shows the absence of autocorrelation effects in the VAR estimates.

Figure 3: Selected Impulse Response Functions from the VAR Estimates

Response to Generalized One S.D. Innovations ± 2 S.E.



V.2 Analysis of the VAR Impulse Responses

The results in figure 3 show that although the relationship between inflation and money supply growth is relatively positive. It is stronger in the second period, suggesting that a shock to money supply begins to impact significantly on inflation in the second period. Once the inflation rate changes, it impacts

positively on the growth of the all-share index and this also occurs in the second period. Thus, if the money supply reflects the stance of monetary policy, it works through the building up or otherwise of inflationary pressures, thereby impacting on the all-share index. This makes the link between monetary policy and the growth in all-share index an indirect one, operating through its impact on inflation. The direct response of ASIG to credit is weak and insignificant, but given that growth in credit to the private sector influences money supply growth positively and significantly, and its subsequent impact on inflation, the ASIG is affected. Put differently, a positive shock to money supply growth would raise credit and inflation, which would then translate into changes in the all-share index.

Thus, a one standard deviation positive shock to MSG would result in about 10 basis points change in the growth of credit in the year of the shock, with the impact lingering for two years, becoming neutral thereafter. Inflation also responds positively to a monetary policy shock that increases the growth of money stock. A one standard deviation shock though, insignificant within the first year, has a medium-term effect of raising inflation in the second year by 9 basis points, owing to the lagged effect of monetary policy. The impact decelerates thereafter and becomes neutral after a couple of years.

All-share index mimics the inflation path with a second period impact of about 10 basis points. This result appears to have reinforced the role of the price mechanism, providing an incentive for firms to produce, increasing their investments and potentials to return value to investors. These dynamics obviously enhances the value of the firm on the market.

Overall, the impulse response suggests that all-share index growth changes with shock to monetary policy, through its impact on credit and largely the rate of change in the price level.

V.3 Variance Decomposition Analysis

The variance decomposition results in table 3 clearly show the importance of the price level in explaining the volatility in the ASIG. The results indicate that a 13 – 17 per cent of the variation in ASIG is driven by changes in inflation, while about 7 – 11 per cent was occasioned by changes in the growth of money supply. It is evident that much of the volatility in inflation is explained by 8 – 31 per cent of the growth in money supply. Changes in the growth of credit to the private sector are also accounted for by about 25 – 31 per cent of the changes in money supply growth and 10.0 per cent of changes in the all-share index growth with a one-period lag.

V. Policy Implications and Conclusion

First, volatility in the price level can result in fluctuations in the asset prices. Therefore, stabilizing prices is necessary for ensuring the stability of the asset prices in the Nigerian economy. Second, there is some evidence of the monetary effects on the price level and implying that money overhang can create bouts of inflationary pressures that will leave prices elevated. This implies that monetary policy has destabilizing effect on the general price level in Nigeria. Since the goal of monetary policy in Nigeria is primarily price stability, the result obtained is quite contrary to expectation. Flexible inflation targeting provides an effective and unified framework for achieving both general macroeconomic stability and financial stability.

Third, money creation occasioned by growth in credit to the private sector could raise monetary growth in the country. Extreme credit growth should, therefore, be accompanied with policies that can keep monetary growth subdued. Fourth, growth in credit affects changes in the all-share index, though with a lag. This requires that monitoring is necessary for a seamless macroeconomic policy adjustment.

The results of this paper shed light on a number of issues on the linkages between monetary policy, asset prices and credit growth in Nigeria. First, the study establishes that volatility in the price level creates instability in stock prices(asset prices) in Nigeria. Second, monetary policy effects, particularly monetary expansion, could create inflationary pressures that will lead to elevated prices in the economy. Third, money creation resulting from excessive growth in credit to the private sector could raise monetary expansion and changes in the Nigerian All-Share Index, though with a lag. These results imply that in designing monetary policy; the central bank cannot ignore the influence of monetary conditions on inflation and credit growth as these have implications for asset prices.

APPENDICES

A. Robustness Diagnostics

Figure 4: Autocorrelation Functions

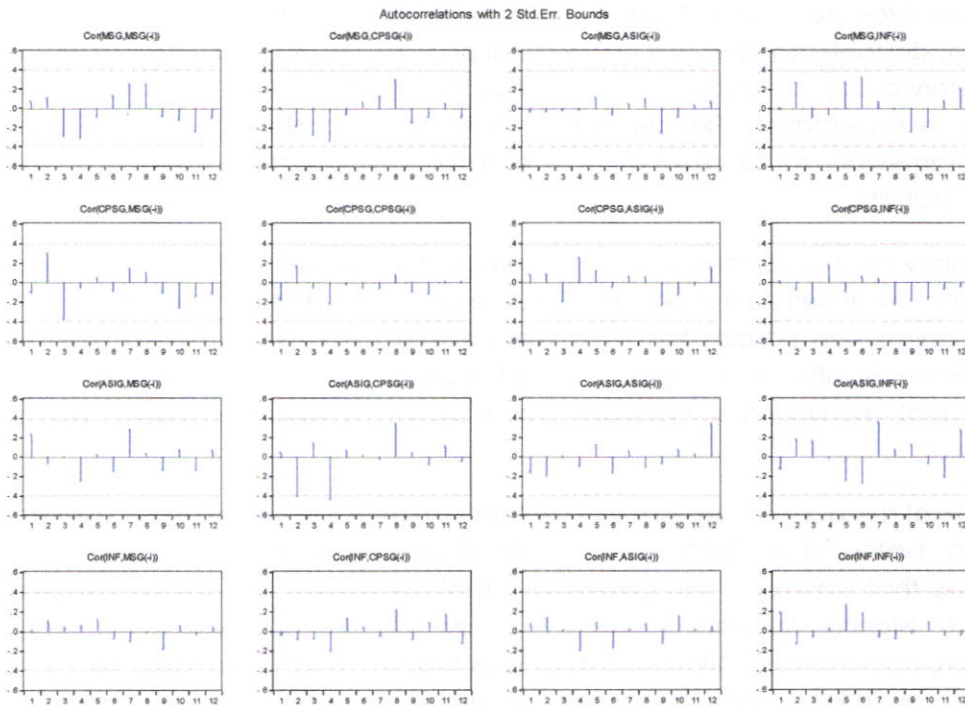


Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-446.3235	NA	5.20e+10	36.02588	36.22090*	36.07997
1	-427.1758	30.63639*	4.13e+10*	35.77406*	36.74916	36.04452*
2	-412.3905	18.92514	5.10e+10	35.87124	37.62642	36.35806

Endogenous variables included: MSG, CPSG, ASIG and INF

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

B. VAR Estimates

Figure 5: VAR Impulse Response Functions

Response to Generalized One S.D. Innovations ± 2 S.E.

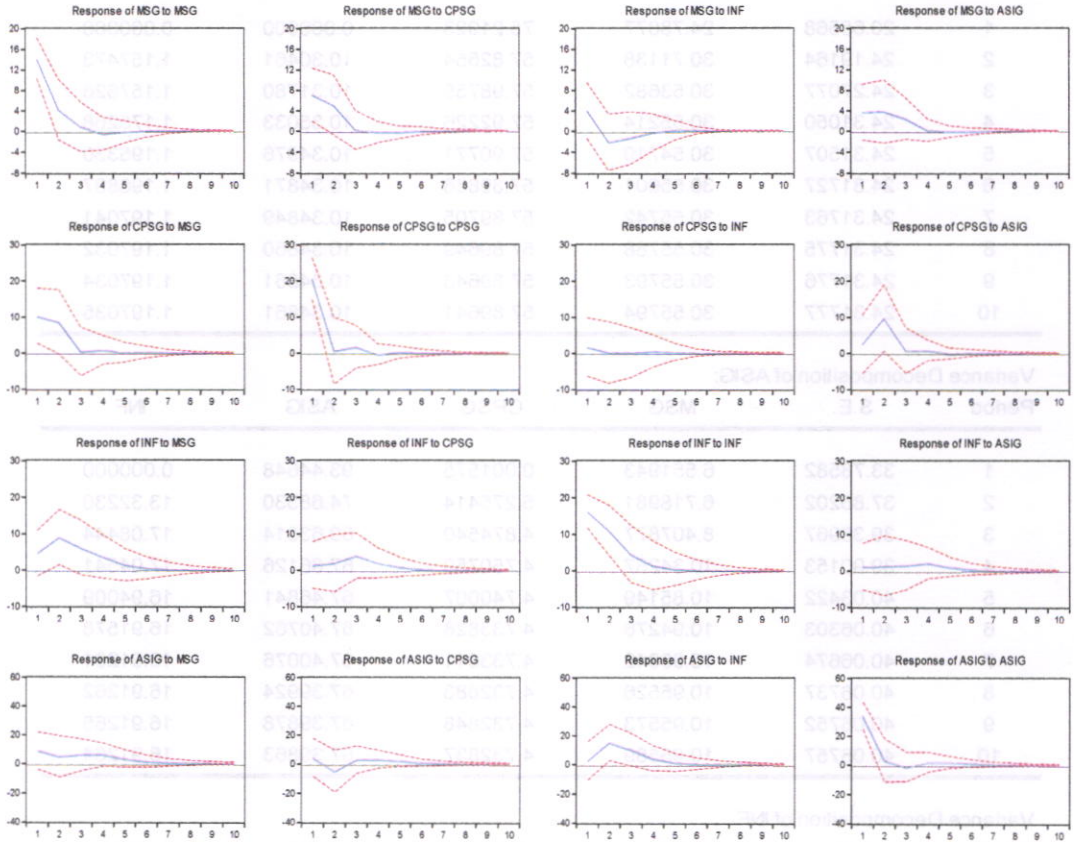


Table 3: Variance Decomposition Results

Variance Decomposition of CPSG:

Period	S.E.	MSG	CPSG	ASIG	INF
1	20.65568	24.78077	75.21923	0.000000	0.000000
2	24.19164	30.71138	57.82654	10.30461	1.157473
3	24.27077	30.53682	57.98755	10.31780	1.157826
4	24.31050	30.55214	57.92226	10.35033	1.175268
5	24.31507	30.54719	57.90771	10.34976	1.195330
6	24.31727	30.55601	57.89838	10.34871	1.196897
7	24.31763	30.55742	57.89705	10.34849	1.197041
8	24.31775	30.55788	57.89649	10.34860	1.197032
9	24.31776	30.55793	57.89643	10.34861	1.197034
10	24.31777	30.55794	57.89641	10.34861	1.197035

Variance Decomposition of ASIG:

Period	S.E.	MSG	CPSG	ASIG	INF
1	33.78582	6.551943	0.001575	93.44648	0.000000
2	37.85202	6.718981	5.275414	74.68330	13.32230
3	39.38967	8.407877	4.874540	69.63314	17.08444
4	39.90153	10.34257	4.750759	67.86126	17.04541
5	40.03422	10.85149	4.740007	67.46841	16.94009
6	40.06303	10.94278	4.733828	67.40762	16.91578
7	40.06674	10.95342	4.733011	67.40076	16.91281
8	40.06737	10.95526	4.732883	67.39924	16.91262
9	40.06752	10.95573	4.732848	67.39878	16.91265
10	40.06757	10.95589	4.732837	67.39863	16.91264

Variance Decomposition of INF:

Period	S.E.	MSG	CPSG	ASIG	INF
1	16.29055	8.120478	0.409351	0.000643	91.46953
2	20.78424	23.82012	2.239376	0.215458	73.72505
3	21.89690	29.28066	2.261810	0.194119	68.26341
4	22.24155	31.07737	2.201809	0.516229	66.20460
5	22.30317	31.32824	2.201628	0.630157	65.83998
6	22.31382	31.36593	2.199557	0.656422	65.77809
7	22.31540	31.37175	2.199248	0.658621	65.77038
8	22.31582	31.37342	2.199176	0.658881	65.76852
9	22.31593	31.37392	2.199156	0.658926	65.76800
10	22.31596	31.37406	2.199151	0.658950	65.76784

Cholesky Ordering: MSG CPSG ASIG INF

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