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The Stock Market Channel of Monetary Policy Transmission Mechanism in Nigeria

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The Nigerian financial sector is undergoing some fundamental reforms. These reforms have brought with it increases in the number of financial variables and increased participation of ordinary citizens in the economy, more especially in the stock market. The nature and level of economic activities in the economy have increased and the stock market is poised to play an increasing role as the financial sector reform takes hold. In order to achieve the goals of financial deepening and sustainable development, monetary policymakers need to pay attention to the impact of policy action on the activities of the Nigerian Stock Exchange. Using monthly data and VAR and ECM, economic methodologies, the stock market reactions to monetary policy decision were examined in this paper. The conclusion is that while the stock market is still at the developmental stage, Monetary Policy Rate (MPR) was found to have a negative and significant effect on the activities of the Nigerian Stock Market by impacting liquidity and credit conditions. Thus, Central Bank's monetary policy rate can be used to send signals to stock market investors, and, therefore, acts as a good anchor in the economy.

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I Introduction

Understanding the effects of monetary policy on the overall economy has been a challenge to researchers and academics alike. Globalization and the associated increase in capital flows and its effect have added another dimension of complication to this task. As an open economy subject to shocks, Nigeria faces particularly difficult challenges in the conduct of its monetary policy. Understanding the effects of monetary policy and the channels through which it is transmitted is critical to its effectiveness. An important aspect of the transmission mechanism which has not been fully explored is the asset channel. Thus, scant guidance is available to help policymakers evaluate changes in policy and their effects on this sector and the overall economy. This paper attempts to study issues relating to the monetary transmission mechanism in Nigeria, focusing mainly on the stock market. Several factors make

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understanding the transmission mechanism of monetary policy in Nigeria particularly important. First, Nigeria is going through the process of financial sector reform and as such, the economy-wide response of monetary policy to the process is of interest to policymakers. Given the volatile regional environment and high dependence of the economy on oil, the likelihood of a major external shock hitting the economy is substantial. The responses of the economy to changes in monetary policy as a result of such shocks are of interest to policymakers and the stock market will definitely be affected by any external shock.

Second, the recent economic reform has brought with it a spurt in asset prices, especially in the volume of participation and price valuation in the stock market. This has raised a question of whether and how monetary policy should respond to these increases and the direction of policy in achieving financial deepening in the stock market, in particular, and the economy, in general. A third issue is how monetary policy could influence credit to the private sector. Since private sector investment/borrowing is financed by stock share offering, a policy-induced increase in the short-term nominal interest rate will affect the portfolio of investments. It is imperative, therefore, that monetary policymakers understand the transmission of monetary policy to the stock market such that any unintended outcome in that market can be counteracted in a timely manner. Thus, the objective of this paper is to investigate the transmission of monetary policy to the stock market and the response of the stock market to changes in monetary policy rate.

This paper investigates the impact of monetary policy on the stock market in Nigeria. We found that the current operating target of monetary policy, the monetary policy rate, influences bank retail rates and the level of activities in the stock market. However, we also found that the level of responsiveness is small and that aggregate activity responds marginally to changes in bank lending rates[1]. The latter are not influencing domestic credit, as the interest elasticity of credit demand is low. The paper explains the reason why policy rate even though moves in the right direction

[1] *This indicates that interest rate seem to be non-responsive in the economy*

according to economic theory, does not have a robust and significant relationship with activities in the stock market. The remainder of the paper is organized as follows: Section II discusses the evolution of monetary policy in Nigeria, and outlines the recent monetary policy stance in Nigeria. Section III reviewed some related literature on monetary policy transmission mechanism. Data and empirical analysis, encompassing description of the data and a presentation of the results are treated in Section IV. Section V presents the main conclusion.

II An Overview of the Evolution of Monetary Policy in Nigeria

The ultimate objective of monetary policy in Nigeria is to promote economic growth by pursuing the mandate of price stability and low inflation. Over the years, the techniques/instruments for achieving these objectives have varied, while maintaining the main objectives. Two major periods have characterized monetary policy in Nigeria: the post-and pre-1986 periods. Prior to 1986, the emphasis on achieving price stability was by using direct monetary controls. However, the emphasis shifted to market mechanisms after the 1986 market liberalization.

Monetary policy prior to 1986 used direct monetary instruments such as credit ceilings, selective credit controls, administered interest and exchange rates, cash reserve requirements and special deposits to combat inflation and maintain price stability. Credit rationing guidelines, which set the rates of change for the components and aggregate commercial bank loans and advances to the private sector, was used to stimulate the productive sectors and stem inflationary pressures. The fixing of interest rates at relatively low levels was done mainly to promote investment and growth. Occasionally, special deposits were imposed to reduce the amount of excess reserves and credit-creating capacity of the banks. Minimum cash ratios were required for the banks in the mid-1970s on the basis of their total deposit liabilities, but since such cash ratios were usually lower than those voluntarily maintained by the banks, they proved less effective as a restraint on their credit operations.

From the mid-1970s, it became increasingly difficult to achieve the aims of monetary policy as monetary aggregates, government fiscal deficit, GDP growth rate, inflation rate and the balance of payments position moved in undesirable directions. The monetary control framework which relied heavily on administered interest rates regime as well as credit ceilings and selective credit controls, increasingly failed to achieve the set monetary targets as their implementation became less effective with time. The interest rate regime and the non-harmonization of fiscal and monetary policies contributed immensely to the problem of effective management. The rigidly controlled interest rate regime had the adverse effect of constraining growth of the money and capital markets. The low interest rates on government debt instruments did not sufficiently attract private sector savers and since the CBN was required by law to absorb the unsubscribed portions of government debt instruments, large amounts of high-powered money were usually injected into the economy. In the oil boom era, the rapid monetization of foreign exchange earnings resulted in large increases in government expenditure which substantially contributed to monetary instability. In the early 1980s, oil receipts were not adequate to meet increasing levels of demands and government borrowed from the Central Bank to finance its deficits, is because of the glut in the supply of oil in the world market which adversely affected the monetary authorities' ability to successfully implement monetary policy.

Monetary Policy Since 1986

The Structural Adjustment Program (SAP) adopted in July, 1986 was aimed at revitalizing the country's troubled economy. It was designed to achieve fiscal balance and balance of payments viability through elimination of price distortions, promotion of the non-oil sector, and achievement of high growth in the private sector. Instead of relying on direct control mechanism for monetary policy a shifted to market-oriented reform was introduced for effective mobilization of savings and efficient resource allocation. However, the adoption of this new framework required improvement in macroeconomic, legal and regulatory environment. The main instrument of the market-based framework is open market operations.

In order to improve macroeconomic stability, liquidity management through the reduction in the maximum ceiling on credit growth allowed for banks; the recall of the special deposits requirements against outstanding external payment arrears to CBN from banks; abolition of the use of foreign guarantees/currency deposits as collaterals for Naira loans; and the withdrawal of public sector deposits from banks to the CBN were implemented.

The rising level of fiscal deficits was identified as a major source of macroeconomic instability prompting government to agree to synchronize fiscal and monetary policies. By 1996, all mandatory sector-based credit allocation mechanisms were abolished. The commercial and merchant banks were subjected to equal treatment since their operations were found to produce similar effects on the monetary process. The liquidity effect of large deficits financed mainly by the Bank led to the acceleration in the growth of monetary and credit aggregates in the economy. The reintroduction of the Dutch Auction System (DAS) of foreign exchange management in July 2002 engendered relative stability, and stemmed further depletion of external reserves during the second half of 2002. However, the financial system was typically marked by rapid expansion in monetary aggregates, particularly during the second half of 2000, influenced by the monetization of rising oil receipts. Monetary growth accelerated significantly, exceeding policy targets by substantial margins. Savings rate and the inter-bank call rates fell generally due to the liquidity surfeit in the banking system while the spread between the deposit and lending rates remained wide.

In recent times, recognizing that policy actions have embedded in it substantial lags, monetary policy was based on a medium-term perspective framework. This shift was in recognition of the fact that monetary policy actions affect the ultimate objectives of policy with a substantial lag. Thus, the shift was to free monetary policy implementation from the problem of time inconsistency and minimize over-reaction due to temporary shocks. Policies have ranged from targeting monetary aggregates to monitoring and manipulating policy rates to steer the interbank rates and by extension other market rates in the desired direction. There is a planned move to

implement inflation targeting in no distant future, as the monetary authority seek ways to have a tighter grip on monetary policy implementation.

III. Theoretical Discussions and Literature Review

The theories on monetary transmission mechanism could be broadly divided into two main categories: the Neoclassical and the Keynesian. The standard neoclassical model considers money to be neutral, which means that changes to the money supply and interest rates have an effect only on nominal variables but never affect real variables such as real GDP. In contrast, Keynesian theories argue that prices do not adjust systematically, so that a change in the money supply could have an effect on real interest rates and, therefore, on economic activity (as long as a country does not fall into a liquidity trap). More recent theories about a firm's decision-making process and on the functioning of financial markets suggest that there may be alternative channels by which interest rates can affect the real economy without resorting to Keynesian price rigidities. It suggests that changes in interest rates affect the return on equity relative to the return on bonds. Thus, relative demand for and prices of stocks and bonds will change, leading to changes in the value of equities (stock), that is, Tobin's Q[2] and the financial wealth of individuals, which would affect output. Finally, interest rates can affect credit to the private sector and, thus, activities, by making higher/lower liquidity available to banks, which would affect their lending through the balance sheet effects.

Both the credit channel and the bank-dependent channel have a strong implication for small firms because they are more dependent on banks for financing. According to (Gertler and Gilchrist 1994; and Oliner and Rudebusch, 1992), there exist disproportionate effects of monetary policy tightening on smaller firms. In simulations by (Cooley and Quadrini, 1999) they showed that the output and stock prices of small firms are more sensitive to changes in monetary policy when creditworthiness is inversely related to the size of the firm.

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[2]*Tobin defines Q as the market value of firms divided by the replacement cost of capital.*

The standard Keynesian interest channel of monetary policy transmission is summarized in Mishkin, (1996). This channel posits that contractionary monetary policy raises the cost of capital, which in turn causes investment and aggregate demand to decline, while an expansionary monetary policy that results in a fall in interest rate on the other hand will increase investment and aggregate demand spending, thus a rise in output. Taylor (1995) concluded that there exists strong interest rates effects on consumer and investment spending, thus a strong monetary transmission even in a world with rational expectations (Mishkin, 1996).

According to the traditional Keynesian *interest rate channel*, a policy induced increase in the short-term nominal interest rate or monetary policy rate leads first to an increase in longer term nominal interest rates, as investors act to arbitrage away differences in risk-adjusted expected returns on debt instruments of various maturities, as described by the expectations hypothesis of the term structure. When nominal prices are slow to adjust, these movements in nominal interest rates translate into movements in real interest rates as well. Firms, finding that their real cost of borrowing over all horizons has increased, cut back on their investment expenditures. Likewise, households facing higher real borrowing costs scale back on their purchases of homes, automobiles, and other durable goods. Aggregate output and employment fall as a result of the firms and consumer decision. This interest rate channel lies at the heart of the traditional Keynesian IS-LM model, due originally to Hicks (1937), and it also appears in the more recent New Keynesian models described below.

In open economies, additional real effects of a policy induced increase in the short term interest rate come about through the *exchange rate channel*. When the domestic nominal interest rate rises above its foreign counterpart, equilibrium in the foreign exchange market requires that the domestic currency gradually depreciate at a rate that, again, serves to equate the risk-adjusted returns on various debt instruments, in this case debt instruments denominated in each of the two currencies—this is the condition of uncovered interest parity. Both in the traditional Keynesian models that build on Fleming (1962), Mundell (1963), and Dornbusch (1976) and in the New Keynesian models, this expected future depreciation

requires an initial appreciation of the domestic currency that, when prices are slow to adjust, makes domestically produced goods more expensive than foreign produced goods. Net exports fall; domestic output and employment fall as well.

Metzler (1995) noted that in addition to interest rate, a better understanding of monetary policy transmission in the economy should include an understanding of other assets prices. This equity price channel involves the Tobin's Q theory of investment and the wealth effect theory of Modigliani. According to the Tobin's Q theory of investment, a contractionary monetary policy makes less money available to the public for spending. The resultant decrease in spending will lead to a decrease in demand for equities and lowering of their prices. A lower price implies lower Q in the Tobin equation, lower investment and aggregate demand.

An alternative channel of monetary transmission through equity prices occurs through the wealth effect of consumption. According to the life-cycle model, consumption spending is determined by lifetime resources of consumers. Common stock constitutes a major component of financial wealth of consumers. Therefore, the wealth effects view of transmission (Modigliani, 1971), states that when the stock prices fall, the value of financial wealth decreases causing consumption to fall and, consequently, aggregate demand to fall as well. However, if stock prices increase, the value of financial wealth increases, therefore, increasing the lifetime resources of consumers. The increase in consumption expenditure will drive employment and output growth.

Bernanke and Gertler (1995) argued that there is a credit channel of transmission which occurs as a result of credit market imperfections. Asymmetric information and costly enforcement of contracts create agency problems in financial markets in two ways: the lending and the balance sheet channel. According to the lending channel view, expansionary monetary policy increases banks' reserves and deposits and, therefore, the amount of credit available. Given banks' role as lenders to borrowers, this increase in available credit will cause investment and spending to rise. The implication of this view is that monetary policy will have greater

effect on expenditure of smaller firms that are more dependent on bank loans than on large firms that can access the stock and bond market. On the other hand, if the policy is contractionary, banks' reserves and deposits decrease resulting in a decrease in loans available to the private sector. The decrease in loan will in turn decrease investment expenditure and, hence, aggregate demand.

The balance sheet channel arises from the existence of asymmetric information in the credit market. The lower the net worth of firms, the more severe the adverse selection and moral hazard problems that result from lending to such firm. Lower net worth reduces the collateral from loans and losses from adverse selection are higher, leading to a decrease in lending and investment.

The stock market is a key link of the transmission mechanism according to both monetarist and Keynesian views (Mishkin, 1995). Tobin's *q* theory assigns to stock prices a central role in transmitting policy shocks to firms' investment. At the same time, stock prices also affect the consumer; through wealth effects (see Meltzer, 1995). Structural macro econometric models of the United States (such as that used by the Federal Reserve Board; Reifschneider *et al*., 1999) ascribe to the stock market a major role in the transmission of monetary policy. In Nigeria, where stock ownership is relatively small but growing fast, exploring this channel is important. Furthermore, the response of stock prices reveals the markets' view of the effects of monetary policy in the economy and sends a signal to monetary policy-makers on how best to stimulate the economy.

The stock market affects monetary policy through several channels. Some have argued that it affects monetary policy through the inflation tax effect on the household's equity holdings (Chami, Cosimano and Fullenkamp, 1999), and others through equity/assets prices (Poddar, Sab and Khachatryan, 2006). Several studies have empirically linked changes in monetary policy and stock market performance in many countries. Many of these studies have suggested that changes in indicators of central bank policy correlate with both short-term and long-term stock market performance. In the face of financial reform, banking consolidation and attempt to deepen the

nation's financial system, it is crucial that proper coordination of monetary policy involves understanding of the transmission mechanism of the policy and what role stock market plays in transmitting the monetary policymakers action to the overall economy.

Many studies have linked the stock market performance with indicators of central bank policy (see Conover et al, 1999). Analyzing the United States economy with high frequency data, some analysts conclude that changes in monetary policy affect short-run stock returns (see Waud, 1970; Smirlock and Yawitz, 1985; Cook and Hahn, 1988). Applying United States data for the period covering 1962 to 1991, (Jensen and Johnson, 1995), focused on long-run monthly as well as quarterly performance of the stock market and find that expected stock returns are significantly greater during expansive monetary periods than in restrictive monetary periods. According to (Conover *et al*, 1999), even in the analysis of international markets, 12 out of the 16 markets used in a cross-country data found that the general relation holds. The implication is that given the benefits of international diversification, active portfolio managers should purchase (sell) stocks in countries where the central bank is easing (tightening) monetary policy.

Economists traditionally associate restrictive monetary policy with higher future interest rate, and lower levels of economic growth. For instance, discrete policy rate changes influence forecasts of market determined interest rates and the equity cost of capital. Through monetary policy transmission mechanism, changes in central bank policies are linked to the stock market, thus affecting aggregate output through consumer expenditure as well as investment spending. Increase in monetary aggregates will lower interest rates and boost stock prices and, therefore, the wealth of stock holders, which will raise consumption through the wealth effect hypothesis (Modigliani, 1971). Another model (Mishkin, 1977) suggests that lower interest rates increase stock prices and, therefore, decrease the likelihood of financial distress, leading to increased consumer durable expenditure and consumer liquidity holding.

On the other hand, higher stock prices lower the yield on stock and reduce the cost of financing investment spending through equity issuance

(Bosworth, 1975). Some models posit that a rise in stock prices leads to increased business investment defined by the equity market value of a firm divided by the book value of the firm. Therefore there is a link between the stance of monetary policy and the stock market yield and returns. Does such a link exist in the Nigerian case? In other words what is the impact of Central Bank actions on the Nigerian stock market? The next section will attempt to answer the question by analyzing some monthly data on Central Bank's policy instruments and data from the Nigerian Stock Exchange from 2000 to 2006.

IV. Empirical Investigation of the Stock Market Transmission of Monetary Policy in Nigeria

IV.I Methodology and Data Sources

Using a mixture of econometric techniques of vector auto-regression (VAR) and error correction model (ECM), and monthly data on broad money (M2), Treasury Bill Rate (TBR), Monetary Policy Rate (MPR), Consumer Price Index (CPI), and the stock market All Share Index (ASI) and Market Capitalization (MC) from 2000 to 2006, an examination of the impact of Bank's action on the Nigerian stock market was undertaken. This period was chosen to capture the effect of economic reform agenda which started in 1999 and the lag effect of such policy. The assumption is that policy response will start in 2000, thus the choice of the start date. The VAR method was chosen because it recognizes the simultaneity between monetary policy variables and stock market response. In essence, it would capture the impact of monetary policy on the stock market and the impact of the stock market on monetary policy actions. Apart from the fact that the model is largely used in the empirical literature examining monetary policy impact, it focuses on reduced form relationship between monetary policy and the variable being studied[3]. Once the estimation is done, the results would be used to simulate the response over time of the variable to its own disturbance or a disturbance to any other variable in the system. It allows for forecast and projections to be made about the variables of interest.

[3] *In this case the variable being considered are the stock market indexes of All Shares and Market Capitalization*

Most macroeconomic series are non-stationary as can be seen from the visual representation of the stock market indices and monetary policy variables (see figure 1). It showed that the variables exhibit trend characteristics, suggesting that they are not stationary.

The consequences of estimation based on such a series are spurious results that cannot be used for inference. For the estimation to be meaningful, it requires that the series be stationary. A unit root test using the Augmented Dickey Fuller (ADF) was carried out and it showed that the variables were stationary at first difference, implying that they are all integrated I (1) processes.

Additionally, the variables were tested for co-integration using the Johansen test (Table 2 presents the test results) and we fail to reject the hypothesis of no co-integration at 5 percent. Co-integration test suggest the existence of at least one co-integration equation at 5 percent level of significance.

Table 1: Unit Root Tests

ADF in Levels t-statistics constant Variables	ADF first difference t-statistics with constant	ADF in levels t -statistics with constant and trend	ADF first difference t-statistics with constant and trend
ASI	-0.83	-6.51	-2.22	-6.46
MC	-1.18	-5.10	-2.21	-4.88
TBR	-2.03	-4.13	-3.15	-4.60
MPR	-1.12	-8.67	-1.62	-8.60
M2	-.29	-7.93	-3.79	-7.89
CPI	-.18	-6.75	-2.72	-6.69
Inf	-1.42	-9.14	-1.52	-9.25

Note: The ADF is the augmented Dickey-Fuller test. Critical Values at the 5% significance level are -3.51.

Figure 1:

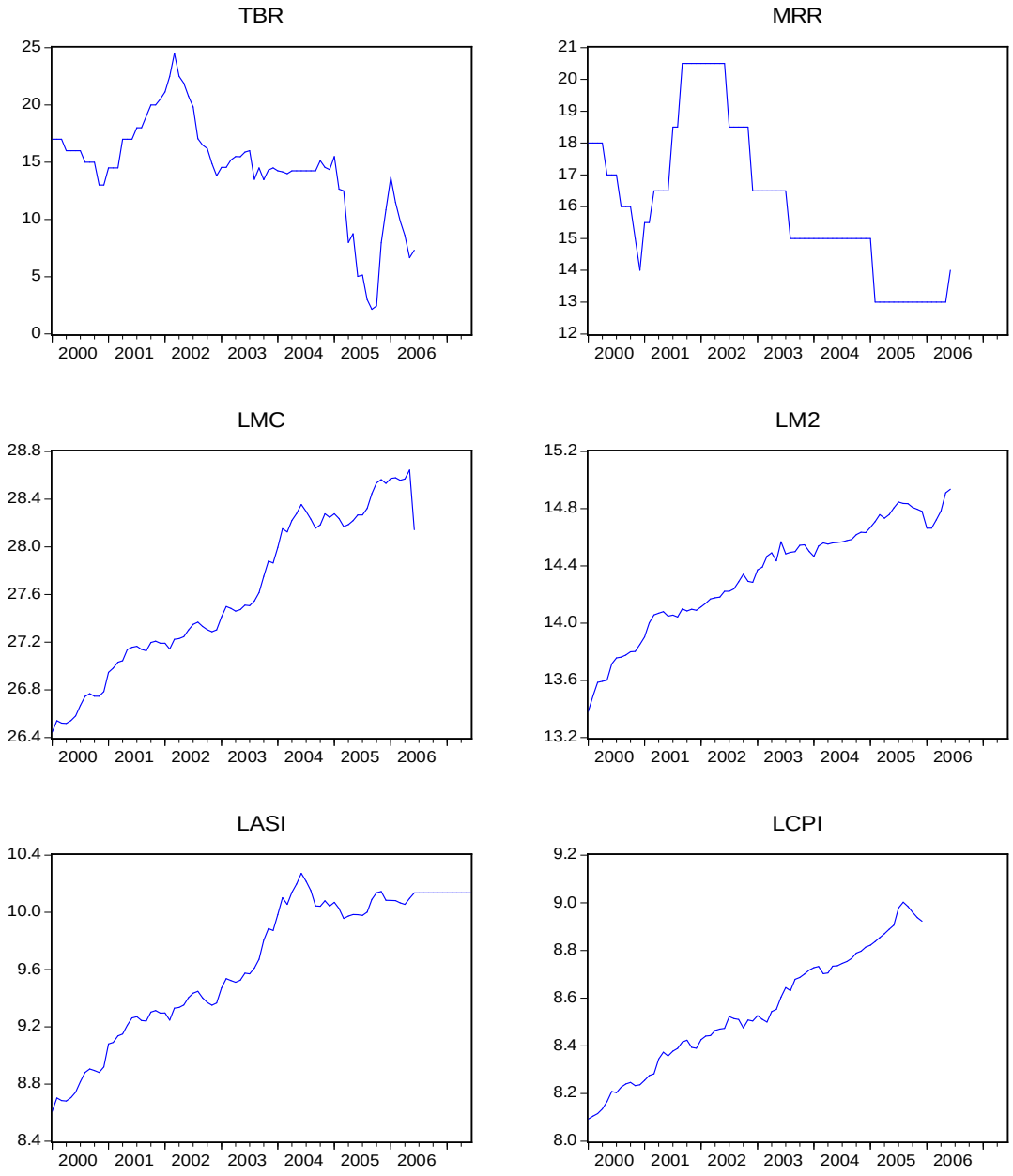
TBR
25
20
15
10
5
0
2000 2001 2002 2003 2004 2005 2006
MRR
21
20
19
18
17
16
15
14
13
12
2000 2001 2002 2003 2004 2005 2006
LMC
28.8
28.4
28.0
27.6
27.2
26.8
26.4
2000 2001 2002 2003 2004 2005 2006
LM2
15.2
14.8
14.4
14.0
13.6
13.2
2000 2001 2002 2003 2004 2005 2006
LASI
10.4
10.0
9.6
9.2
8.8
8.4
2000 2001 2002 2003 2004 2005 2006
LCPI
9.2
9.0
8.8
8.6
8.4
8.2
8.0
2000 2001 2002 2003 2004 2005 2006

Table 2: Co integration Analysis of the Equation

p-r	r	T*	C*(5%)
4	0	78.34	69.81
3	1	42.35	47.86
2	2	18.92	29.79
1	3	7.97	15.49

Notes: P is the number of variables and r the number of co-integrating vectors. T* is the trace test calculated under the hypothesis of linear relationship and C* is the critical value at the 5% level.

After stationarity was achieved, two regression equations were estimated using both the All-Share Index (ASI) and Market Capitalization (MC) as dependent variables. While the coefficients were all statistically significant, with high $R^{2,}$ the Durbin-Watson statistics was low suggesting multi-colinearity in the regression. Since this kind of results cannot be used for analysis or inference, there was a need for the use of error correction model to address the problem. The residual of the regression was extracted as an error correction term (ECM) and added to the regression which improved the regression results.

IV.2 Regression Results

Ordinary least square estimation was also used to determine the magnitude of the effect of monetary policy variables on the stock market indices. The first equation looked at the effect of Central Bank actions on the stock market All-Share Index. The functional form used is as follow:

The equation result is presented below

$$\Delta.ASI = \Delta.\beta\, Xi + \varepsilon \qquad (1)$$

Where X = (money supply (M2), MPR, CPI, TBR)

Table 3: All Share Index Response to Central Bank Monetary Policy Actions

Variable	Coefficient	t-Statistics
$\Delta \log M2_{t-1}$	0.395364	3.586
ΔMPR_{t-1}	-0.0444	-5.7011
$\Delta \log CPI_{t-1}$	1.348	7.7275
ΔTBR_{t-1}	0.0342	8.1826
ECM_{t-1}	0.7202	10.0078
R2	**.97**	
Durbin-Watson Stat	**1.87**	

A Ramsey test was carried out to determine the stability of the equation

From Table 3 above, all variables are significant at 1 per cent. It also indicates that broad money supply has a positive relationship with the stock market which is consistent with theoretical en empirical findings. A higher level of money supply suggests an expansionary monetary stance, and will be expected to lead to more participation/investing in the stock market. The monetary policy rate (MPR) has the expected negative sign and is significant. This indicates that increases in the monetary policy rate will lead to a rise in interest rate. The higher interest rate will increase savings rate and individual investors will find it less risky to put their money in the bank instead of the more risky stock market. The sign of consumer price index (CPI) can either be negative or positive. In this case, it is positive and significant suggesting that investors see stock market as a long-run investment and a rise in inflation will induce investors to put their funds in the stock market instead of other short-term money assets. This is in line with economic theory which suggests that in an inflationary situation, investors are more willing to invest in tangible products than in the banking sector.

The expected sign of the treasury bills rate is negative. However, in the model, treasury bills rate has a positive and significant sign. This suggests that increases in the treasury bills rate will lead to increases in the all share index. The expected direction of causality will be that a rise in TB rate will shift investment from the risky stock market to a more secured

treasury bills. One explanation for this could be that better ways of communicating monetary policy to the public are needed to inform them when policies have changed. Another reason could be that the market is still growing and developing, thus no matter the rate of treasury bills, investors are willing to invest and participate in the stock market since many new and promising companies are coming on board the Nigerian Stock market. The impulse response (see figure 3) function indicates that TBR responds in a positive direction to both market capitalization and all share index. Additionally, it could be that the investing public is not educated or sophisticated enough to understand the market dynamics.

Another regression was estimated with the market capitalization as the dependent variable.

$$\Delta ASI = \Delta Xi + \varepsilon \qquad (2)$$

Where X = (money supply (M2), MPR, CPI, TBR)

The market capitalization of a company is how much investors think the entire company is worth, based on the current share price times the total number of shares outstanding, while all share index is a capitalization-weighted index. The same result and signs were obtained as with the model using the all share index, however, the money supply variable was insignificant, suggesting that a rise in broad money supply does not have a an impact on market capitalization. This could be due to the fact that the stock market has a lot of financial investment embedded in it that domestic money supply will not have that much effect on market capitalization. It was only significant at 20 percent, while the rest remained significant at 1 percent.

Table 4: All Share Index Response to Central Bank Monetary Policy Actions

Variable	Coefficient	t-Statistics
$\Delta \log M2_{t-1}$	0.1578	1.2750
ΔMPR_{t-1}	-0.0425	-4.8585
$\Delta \log CPI_{t-1}$	2.1457	10.9519
ΔTBR_{t-1}	0.0231	4.9168
ΔECM_{t-1}	0.7817	9.6767
R2	**.98**	
Durbin-Watson Stat	**1.78**	

Granger causality (GC) test is performed to address the fundamental question of what variable causes movement in a particular series. The direction of causation is important in the understanding of Monetary Transmission Mechanism. Table 3 in the appendix provides the pair-wise Granger test, from which the following observations are made:

Granger causality (GC) test is performed to address the fundamental question of what variable causes movement in a particular series. The direction of causation is important in the understanding of Monetary Transmission Mechanism. Table 3 in the appendix provides the pair-wise Granger test, from which the following observations are made:

i) Changes in money supply Granger-causes changes in consumer price index
ii) Changes in consumer price index Granger-causes changes in Treasury Bills Rate, however, it is not true in the opposite direction.
iii) Changes in money supply Grange-causes changes in market capitalization
iv) Changes in money supply GC changes in All Share Index; however, the reverse is not the case.

The decision rule is based on the 5 percent level of significance (see Table 5 in appendix).

IV.3 Analysis of Findings

The dynamic causal relationship between monetary policy variables and stock market indices was estimated using the impulse response function (see figure 3). The ordering adopted in the paper is (LMC, LM2, MPR, LCPI, and TBR). The ordering of the variables imposes restrictions on the Choleski matrix. Thus ordering takes care of the stylized facts. However, caution is echoed in the literature that once the ordering changes, the impulses response function are likely to change as well affecting our interpretation of the results. Results of the Impulse Response Function (presented in the appendix) suggest that initially, activities in the stock market react slowly to shocks to money supply before taking off and ending at a higher level. Increases in monetary policy rate (MPR) leads to decreases in market capitalization, market capitalization has a positive response to TBR. An increase in TB rate signals an initial increase in market capitalization which reaches its peak after the third quarter and then declines. The variable decomposition of the VAR models suggest an increasing impact of the monetary policy rate (MRR), of up to 15 percent of percent of the movement in All Share Index at the tenth period. However in the case of Market Capitalization, both CPI and MRR explain about 24 percent of the change in market capitalization at the tenth period. Results of variance decomposition which indicates the forecast error (SE) of the variables and the variation of the components shocks of the endogenous variables to the VAR is reported in the Table 5 of the appendix.

V. Recommendations and Conclusion

As Bernanke puts it: "Monetary policy matters for the stock market, but, on the other hand, it is not one of the major influences on equity prices." As can be seen in the Nigerian case, monetary policy matters for the level of activities in the stock market. Official rate changes can influence expectations about the future and increase the level of confidence with which those expectations are held. Such changes in perception will affect participants in financial markets and activities in the stock market. A rate rise could, for example, be interpreted as indicating that the monetary authority believes that the economy is likely to be growing faster than

previously thought, giving a boost to expectations of future growth and confidence in general. However, it is also possible that a rate rise would be interpreted as signaling that the monetary authority perceives the need to slow the growth in the economy and this could affect expectations and lower confidence.

As the Nigerian population becomes better informed of monetary policy actions through better communication and transparency, and their implication in the economy and as stock market investment becomes an option to ordinary Nigerian citizens, the robustness of the effect of monetary policy on the stock market will be more pronounced. Although a study by Bernanke and Gertler (1996) concluded that "...unexpected changes in monetary policy account for a tiny portion of the overall variability of the stock markets" by examining prices in the Federal funds futures market, there is no doubt that the effect on policy in this segment of the market is important to policy planners.

V.1 Recommendations

- Current reforms of the Nigerian capital market should be continued, and effort geared towards further deepening of the market to better act as a leading indicator to monetary policy decisions should go unabated despite the recent slowdown in the stock market prices.

- Credibility and transparency of monetary policy should be regarded and treated as a major objective of the ongoing reforms of the Central Bank of Nigeria

- Development and introduction of more instruments of liquidity management is considered important for the achievement of better results in monetary policy management.

- The need to further improve monetary policy communication as a means of sensitizing the public to look up to monetary policy decisions as a guide for investment decision in the stock market is essential.

V.2 Conclusion

Why is it important to investigate the channels through which monetary policy impulses are transmitted to the economy? This question, while difficult to answer completely because of lags and feedback effects, is very essential for the conduct of monetary policy. Furthermore, a complex economy operating in a wider world context will not always react in a predictable way to a particular policy initiative. However, effort should be made at understanding both the magnitude and direction of monetary policy change on the stock market, since this market is becoming an increasingly large part of the economy with the introduction of big companies like Transcorp and others that have come aboard in the last couple of years. The Nigerian capital market is growing at a rapid pace with increased appetite for Nigerian assets by residents and non-resident alike which has further elevated the importance of the stock market in the overall economy and the need for the monetary authorities to devote considerable attention to the sector in the implementation of monetary policy.

Individuals and businesses decide to buy or sell goods and services and to borrow or lend on the basis of current and expected values of income, interest rates, and prices. In addition, they respond to the costs of obtaining credit. The Central Bank is responsible for analyzing these influences and formulating monetary policy that appropriately considers them, thus, this attempt at understanding the direction of change in the stock market in Nigeria.

Monetary policy around the world is still largely conducted with an eye toward domestic economic conditions and is guided heavily by domestic monetary and financial variables. Thus, understanding how developments in the domestic environment affect the policy are essential for successful conduct of monetary policy.

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Appendix

Figure 2: Residual of the Variables used in the Analysis

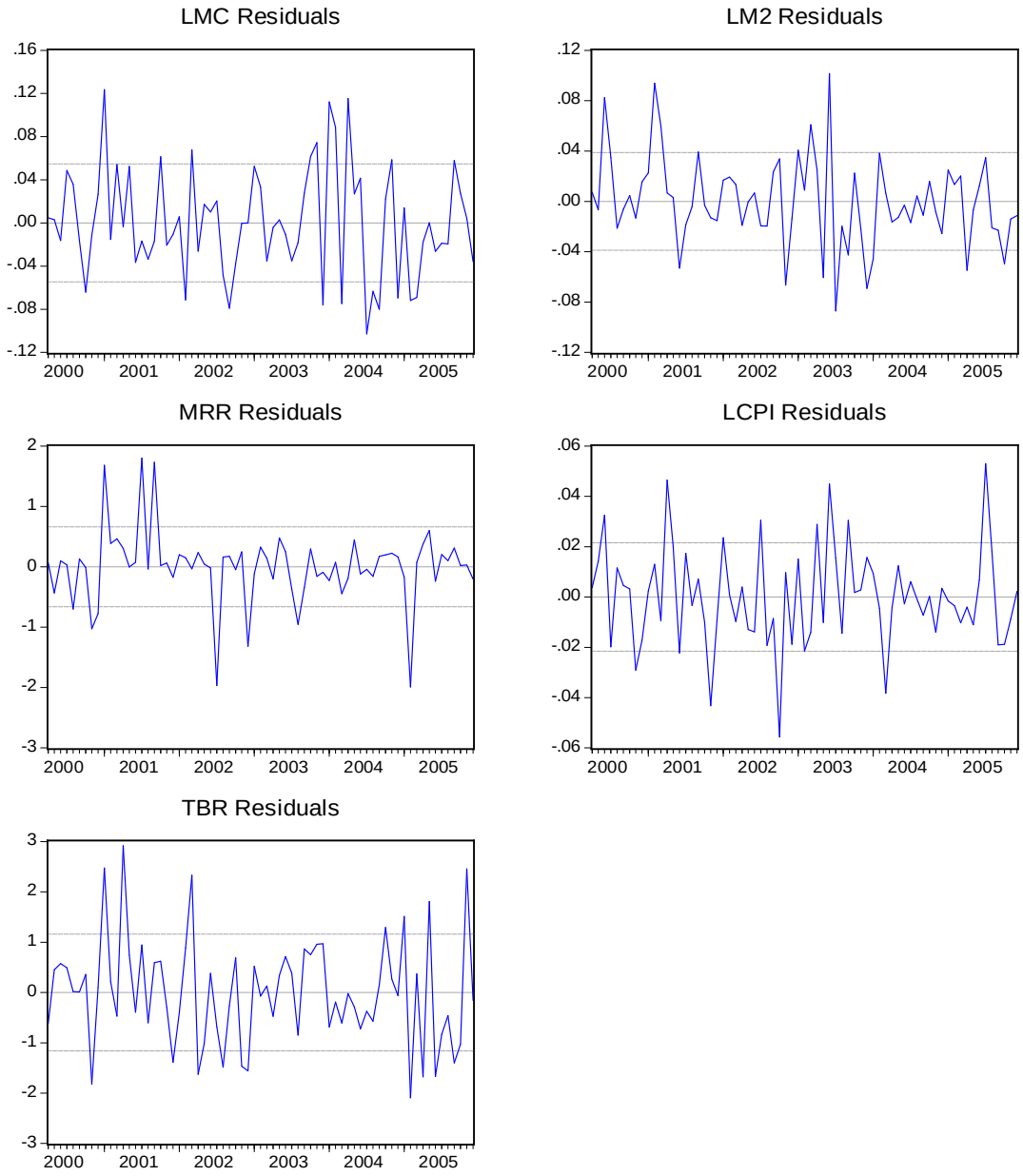

Figure 3: Impulse Response Function of All Share Index to all Variables

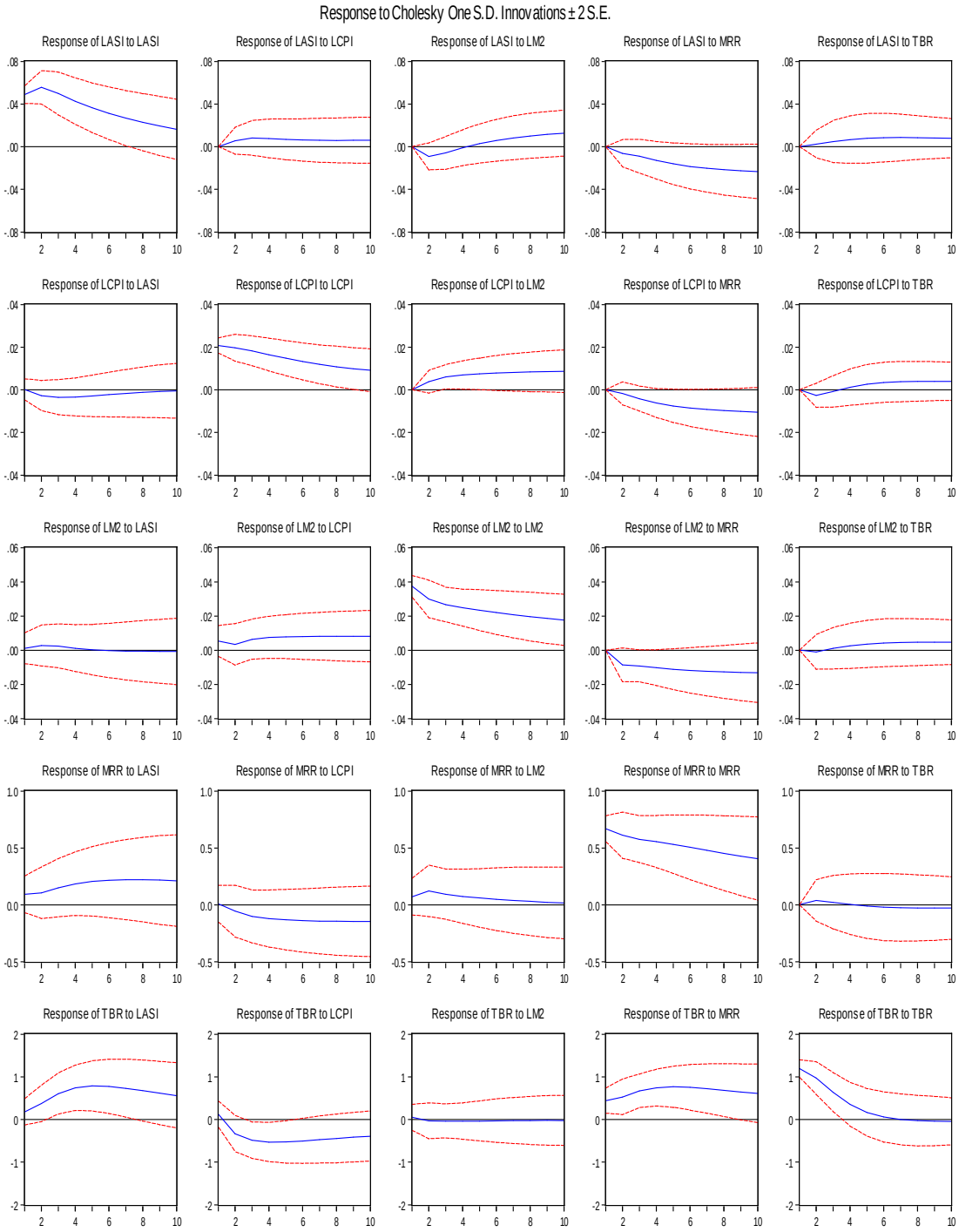

Table 5: Variance Decomposition of the Variables

Variance Decomposition of LASI:

Period	S.E.	LASI	LCPI	LM2	MRR	TBR
1	0.048814	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.075099	97.16136	0.551533	1.501838	0.676484	0.108786
3	0.091261	95.64307	1.149998	1.435941	1.430156	0.340833
4	0.102030	93.94682	1.479123	1.158935	2.734454	0.680666
5	0.110053	91.70021	1.656363	1.064045	4.495903	1.083478
6	0.116514	89.00156	1.764297	1.203544	6.543780	1.486819
7	0.121991	86.00879	1.844282	1.553516	8.744927	1.848484
8	0.126805	82.85223	1.917729	2.070628	11.00708	2.152329
9	0.131152	79.63097	1.996292	2.708135	13.26615	2.398448
10	0.135161	76.42048	2.086391	3.422603	15.47668	2.593847

Variance Decomposition of LCPI:

Period	S.E.	LASI	LCPI	LM2	MRR	TBR
1	0.020776	0.007753	99.99225	0.000000	0.000000	0.000000
2	0.029163	0.921292	96.28741	1.660893	0.322631	0.807772
3	0.035370	1.621250	92.07007	4.104168	1.605043	0.599466
4	0.040272	1.960456	87.74462	6.120245	3.623241	0.551440
5	0.044373	2.043620	83.40289	7.847940	5.900976	0.804579
6	0.047918	1.982186	79.18844	9.396808	8.227691	1.204876
7	0.051062	1.855209	75.20765	10.81128	10.50340	1.622458
8	0.053910	1.711164	71.50194	12.10713	12.68428	1.995494
9	0.056538	1.573990	68.07690	13.28988	14.75331	2.305912
10	0.058995	1.452276	64.92413	14.36231	16.70563	2.555655

Variance Decomposition of LM2:

Period	S.E.	LASI	LCPI	LM2	MRR	TBR
1	0.037781	0.076499	1.992410	97.93109	0.000000	0.000000
2	0.049148	0.340849	1.660831	94.88799	3.057892	0.052437
3	0.057068	0.432280	2.479702	92.14481	4.873610	0.069597
4	0.063580	0.379416	3.364092	89.48632	6.555363	0.214804
5	0.069197	0.321422	4.126865	86.93601	8.164757	0.450945
6	0.074129	0.281303	4.768974	84.54532	9.687329	0.717076
7	0.078514	0.254975	5.317688	82.33723	11.11754	0.972568
8	0.082456	0.237222	5.795437	80.30419	12.46330	1.199855
9	0.086038	0.224944	6.217977	78.42561	13.73608	1.395385
10	0.089323	0.216550	6.596047	76.67956	14.94612	1.561718

Variance Decomposition of MRR:

Period	S.E.	LASI	LCPI	LM2	MRR	TBR
1	0.679230	1.828648	0.020502	1.096735	97.05411	0.000000
2	0.930161	2.229468	0.380881	2.311116	94.91448	0.164057
3	1.113209	3.350727	1.124269	2.309742	93.06343	0.151830
4	1.265719	4.714095	1.785146	2.124097	91.25843	0.118229
5	1.395665	6.043507	2.366928	1.927559	89.55802	0.103986
6	1.507444	7.243629	2.880132	1.753173	88.01467	0.108400
7	1.604120	8.290683	3.339267	1.604683	86.64334	0.122031
8	1.688135	9.190289	3.755746	1.479634	85.43590	0.138430
9	1.761495	9.958120	4.137330	1.374576	84.37530	0.154679
10	1.825842	10.61159	4.488966	1.286368	83.44323	0.169850

Variance Decomposition of TBR:

Period	S.E.	LASI	LCPI	LM2	MRR	TBR
1	1.294560	1.904041	0.939746	0.160459	11.50693	85.48883
2	1.773933	5.457607	3.999191	0.117175	14.95604	75.46999
3	2.146417	11.70333	7.808712	0.109088	19.97688	60.40199
4	2.473571	17.78314	10.50481	0.108936	24.06303	47.54008
5	2.762440	22.37810	12.06523	0.105280	26.96921	38.48218
6	3.009387	25.48801	12.96324	0.099473	28.98732	32.46196
7	3.215506	27.50590	13.52723	0.093820	30.43944	28.43361
8	3.385852	28.79289	13.92492	0.089382	31.54121	25.65161
9	3.526659	29.60203	14.23357	0.086456	32.42030	23.65764
10	3.643727	30.09800	14.48788	0.085096	33.15112	22.17792

Cholesky Ordering: LASI LCPI LM2 MRR TBR

Figure 4: Impulse Response Function of Market Capitalization

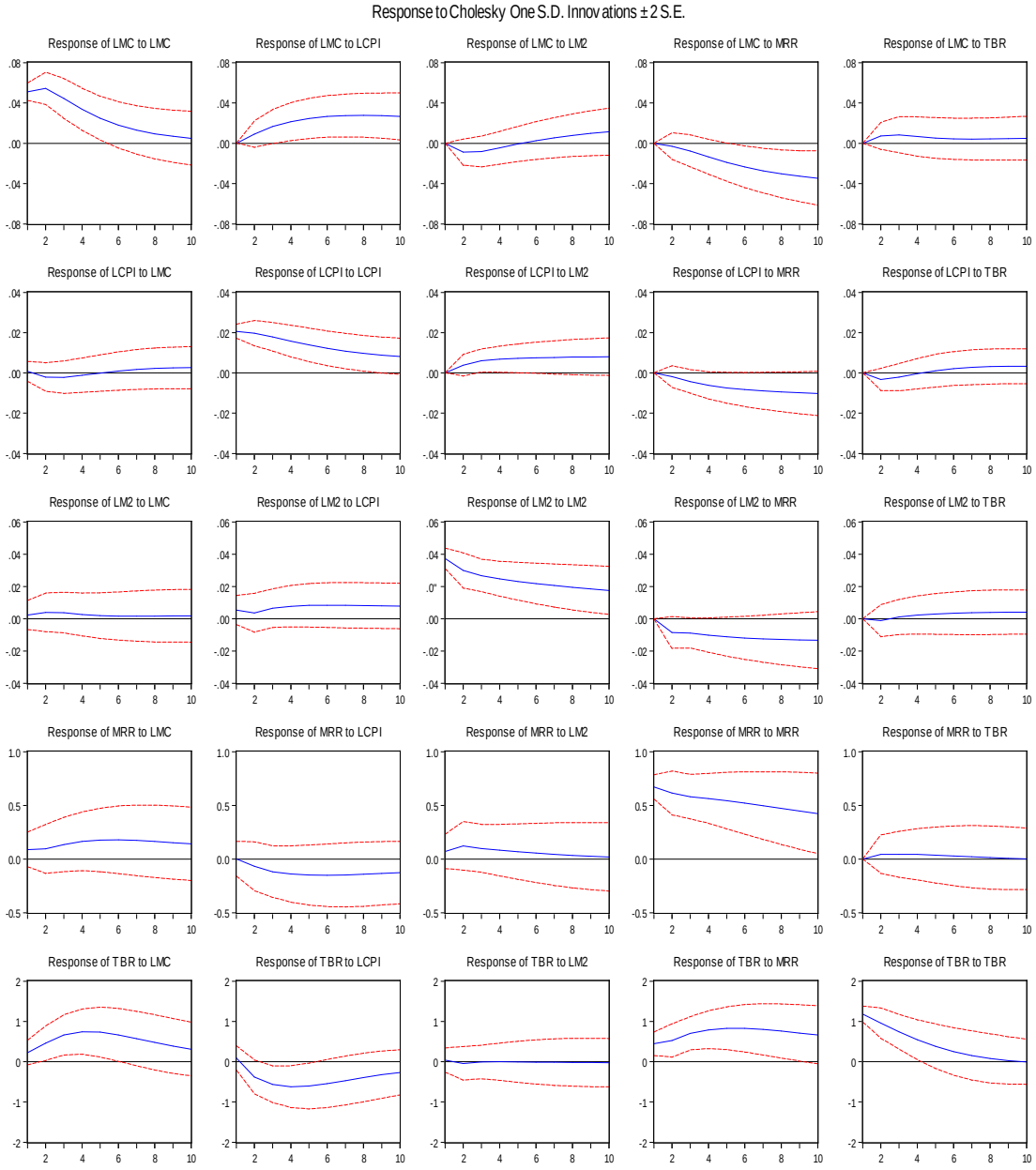

Table 6: Variance Decomposition of Market Capitalization

Variance Decomposition of LMC:					
Period	S.E.	LMC	LCPI	LM2	MRR
1	0.050953	100.0000	0.000000	0.000000	0.000000
2	0.075996	96.18558	1.401026	1.362294	0.145967
3	0.090653	91.61163	4.314980	1.770916	0.823832
4	0.100273	86.10303	8.083679	1.659223	2.504975
5	0.107974	79.52723	12.15694	1.436262	5.234989
6	0.115174	72.35499	15.97896	1.313175	8.770628
7	0.122394	65.21046	19.17299	1.361035	12.74511
8	0.129746	58.55860	21.59722	1.575283	16.81948
9	0.137179	52.63247	23.28547	1.920559	20.75457
10	0.144600	47.48725	24.35864	2.355833	24.41461
Variance Decomposition of LCPI:					
Period	S.E.	LMC	LCPI	LM2	MRR
1	0.020702	0.125415	99.87458	0.000000	0.000000
2	0.029155	0.586040	96.02580	1.713552	0.412712
3	0.035131	0.788028	91.98254	4.199646	1.783202
4	0.039617	0.715409	88.17658	6.261581	3.853496
5	0.043243	0.601029	84.29777	8.020113	6.188996
6	0.046351	0.559611	80.29233	9.567443	8.600612
7	0.049135	0.611032	76.28230	10.94552	10.97855
8	0.051704	0.728431	72.40443	12.17377	13.26856
9	0.054119	0.872090	68.75517	13.26458	15.45057
10	0.056418	1.008662	65.38414	14.22845	17.52210
Variance Decomposition of LM2:					
Period	S.E.	LMC	LCPI	LM2	MRR
1	0.037767	0.365880	1.999684	97.63444	0.000000
2	0.049204	0.831139	1.712037	94.29363	3.095589
3	0.057197	1.025395	2.557463	91.59693	4.737559
4	0.063665	0.984760	3.519253	88.90844	6.404554
5	0.069210	0.903642	4.382021	86.33957	8.051514
6	0.074078	0.832737	5.093316	83.95444	9.638500
7	0.078410	0.780294	5.662478	81.76514	11.14773
8	0.082304	0.744601	6.116264	79.75849	12.57617
9	0.085835	0.721778	6.482538	77.91285	13.92810
10	0.089063	0.707673	6.784896	76.20586	15.21070

Variance Decomposition of MRR:

Period	S.E.	LMC	LCPI	LM2	MRR
1	0.680180	1.679357	0.000652	1.059246	97.26074
2	0.933087	1.909093	0.541748	2.259663	95.06531
3	1.118345	2.781350	1.498860	2.333142	93.08212
4	1.274013	3.786737	2.357909	2.208582	91.30374
5	1.406197	4.675646	3.076956	2.042316	89.85727
6	1.518881	5.382808	3.643549	1.880913	88.75944
7	1.614968	5.910655	4.075215	1.737732	87.96562
8	1.696928	6.286913	4.398150	1.614899	87.41276
9	1.766936	6.544702	4.638052	1.510957	87.03996
10	1.826900	6.714309	4.816713	1.423567	86.79623

Variance Decomposition of TBR:

Period	S.E.	LMC	LCPI	LM2	MRR
1	1.286908	3.044172	0.522588	0.095486	11.95552
2	1.790310	8.135415	4.803600	0.110050	14.81107
3	2.237299	14.03456	9.395754	0.071690	19.39331
4	2.621520	18.29864	12.54766	0.052372	23.23382
5	2.933962	20.85060	14.29778	0.042345	26.51060
6	3.177268	22.16530	15.15141	0.037356	29.36551
7	3.362620	22.69547	15.48362	0.035358	31.87046
8	3.503131	22.76484	15.52826	0.035354	34.05758
9	3.610477	22.58582	15.42558	0.036910	35.94900
10	3.693831	22.29038	15.25744	0.039877	37.56982

Cholesky Ordering: LMC LCPI LM2 MRR TBR

Table 7: Pair-wise Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Probability	Decision Rule
LM2 does not Ganger Cause LCPI	70	3.0595	.05372	Reject H_0
LCPI does not Ganger Cause LM2		.57533	.56536	Don't reject H_0
LMC does not Ganger Cause LCPI	70	.085294	.43087	Do not reject H_0
LCPI does not Ganger Cause LMC		5.83550	.00467	Don't reject H_0
MPR does not Ganger Cause LCPI	70	.36990	.69225	Don't reject H_0
LCPI does not Ganger Cause MPR		.90998	.40760	Don't reject H_0
TBR does not Ganger Cause LCPI	70	1.03569	.36076	Don't reject H_0
LCPI does not Ganger Cause TBR		5.19636	.00806	Reject H_0
LASI does not Ganger Cause LCPI	70	.61811	.54210	Don't reject H_0
LCPI does not Ganger Cause LSAI		2.39518	.09916	Don't reject H_0
LMC does not Ganger Cause LM2	76	1.22967	.29854	Don't reject H_0
LM2 does not Ganger Cause LMC		4.84523	.01065	Reject H_0
MPR does not Ganger Cause LM2	76	2.06266	.13467	Don't reject H_0
LM2 does not Ganger Cause MRP		.92472	.40137	Don't reject H_0
TBR does not Ganger Cause LM2	76	3.09195	.05158	Don't reject H_0
LM2 does not Ganger Cause TBR		1.10805	.33584	Don't reject H_0
LASI does not Ganger Cause LM2	76	.47414	.62438	Don't reject H_0
LM2 does not Ganger Cause LASI		3..29699	.04273	Reject H_0
MPR does not Ganger Cause LMC	76	.75102	.47560	Don't reject H_0
LMC does not Ganger Cause MPR		.18535	.83121	Don't reject H_0
TBR does not Ganger Cause LMC	76	.71348	.49342	Don't reject H_0
LMC does not Ganger Cause TBR		.95226	.39074	Don't reject H_0
LASI does not Ganger Cause LMC	76	1.63453	.20230	Don't reject H_0
LMC does not Ganger Cause LASI		.02349	.97679	Don't reject H_0
TBR does not Ganger Cause MPR	76	.20926	.81168	Don't reject H_0
LM2 does not Ganger Cause MPR		3.16880	.04806	Don't reject H_0
LASI does not Ganger Cause MPR	76	.20146	.81800	Don't reject H_0
MPR does not Ganger Cause LASI		1.54739	.21989	Don't reject H_0
LASI does not Ganger Cause TBR	76	.63837	.53116	Don't reject H_0
TBR does not Ganger Cause LASI		.92688	.40052	Don't reject H_0