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Aims and Scope

The Economic and Financial Review is published four times a year in March, June, September and December by the Research and Statistics Department of the Central Bank of Nigeria. The Review contains articles on research undertaken at the Bank, in particular, and Nigeria, in general, mainly on policy issues both at the macroeconomic and sectoral levels in the hope that the research would improve and enhance policy choices. Its main thrust is to promote studies and disseminate research findings, which could facilitate achievement of these objectives. Comments on or objective critiques of published articles are also featured in the review. *The views and interpretation contained in the articles published in the Review are those of the authors and do not necessarily represent the views and policies of the Central Bank of Nigeria.*

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CONTENTS

Analysis of the Effects of Policies of Microfinance Institutions on the Technological Capabilities of Micro-borrowers in Nigeria

*Kalu O. Oji, Ph.D**

A study was conducted to determine the effects of Microfinance institutions' policies on the technological capabilities of micro-borrowers in Nigeria. Nine (9) Microfinance institutions and 250 of their clients were surveyed in 2005 and 2006. The findings showed that between 2001 and 2005 there were significant growth in the clientele, savings, and loans made by the MFIs reflecting increasing demand for microfinance services. The regression results showed that the technological capability of micro-borrowers were affected by the number of employees/workers, duration of their loans, age of major machinery/ equipment of the enterprise, and the degrees of appropriateness of the machinery/ equipment to workers' skills, and available infrastructure. The operator's length of experience, and interest rate on MFI loans negatively influenced technological capability. In order to encourage technology accumulation through micro-financing, MFIs should increase the duration of clients' loans, spread the repayment over a longer period, and increase the moratorium as well as introduce low-interest loan products for technology acquisition.

Keywords: Microfinance, Technological capability, Micro-borrowers, Micro-enterprises
JEL Classification Numbers: G21, O33, O17.
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I. Introduction

The clients of microfinance institutions (MFIs) are usually small-scale operators and firms in the informal sector of the economy. These operators are usually engaged in a variety of activities ranging from artisanship, weaving, metal-working, furniture-making, soap-making, crafts, shoes production, automobile mechanics, petty-trading, food-processing, agriculture, etc., using simple technologies. They flexibly

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employ simple implements and tools, a few employees, mostly household members, and a small capital base to produce limited volume of output (Aluko et al, 1972; Odo, 1994). The micro-producers are usually of low educational level, and skills acquisition and accumulation is largely by traditional apprenticeship characterized by learning-by-observation-and-doing. Enterprise ownership is mostly dominated by sole-proprietorship, or owner-operated forms based on apprentice or household labor. The major objective of these micro-entrepreneurs is largely to secure subsistence, and to save any little surplus for future consumption needs - a form of insurance. Consequently the prospect of expanding production and investment from own-generated resources is almost secondary. However, these enterprises can respond to incentives and opportunities to improve their capital base and technology. Eboh (2002) showed that even though the average annual rate of expansionary investment among artisans in South-Eastern Nigeria was abysmally low, less than 5%, they showed generally high willingness to expand their capital base, operational performance and overall enterprise growth. This was reinforced by the observation that over 80% of the artisans indicated willingness to continue self-enterprise rather than fold up for paid public or private employment.

The major means of injecting capital and technology to micro-producers is usually through the provision of *micro-credit*. Micro-credit is the delivery of credit services, usually small loans to the poor and other low-income people lacking access to formal banking institutions and services (Seibel, 2003; 2004; Rogally, 1999). However, the peculiar economic characteristics and requirements of this category of borrowers require that credit should be accompanied by savings products, supervision, advisory services, training, and other services. The provision of credit alongside these other services constitutes *micro-finance*, and the process is referred to as *micro-financing* (Mirero, 2004). According to Nweze (2001) and Zeller *et al* (2001) micro-finance is a term referring to the provision of a variety of services such as small loans, saving facilities, and other financial services designed for people excluded from conventional financial services on account of lack of collaterals, illiteracy, etc. The institutions engaged in delivering microfinance services to the poor or low-income operators are known as *Microfinance Institutions* (MFIs). Microfinance institutions can be banks or

non-banks. Under the New Microfinance Policy in Nigeria (CBN, 2005), bank MFIs are registered as Microfinance banks and regulated by the Central Bank of Nigeria, while registered non-bank MFIs are only required to forward periodic returns on their activities to the CBN.

Eboh (2002) noted that the urban micro-enterprise sub-sector in Nigeria is characterized by low capital intensity and predominance of domestic resources; hence it provides an amenable medium of economic participation by many poor people. These micro-enterprises represent a source of subsistence, employment, and income for their owner. Poverty is a major problem among micro-operators. Poverty and the limited income imply that they lack capital to expand their operations. Thus, the provision of microfinance services represents a major strategy for poverty alleviation among the enterprising poor.

Several microfinance schemes provide loans to enable potential entrepreneurs start small-scale enterprises; unfortunately, these schemes only provide subsistence living for the proprietor or beneficiary with no possibility of providing jobs for others in the community. To provide jobs for others as well as improve the living conditions of the operators, microfinance schemes should be able to upgrade the activities of the operators from subsistence living to small-scale enterprises through the injection of technology into their operations. The injection of technology enables the operator to improve efficiency and expand the scale of production, thereby employing more people. Technology plays a vital role in the transformation of the activities of micro-operators as it can improve the rate of adoption, level of productivity, and income of the operation. In spite of this realization, there are no documented studies to guide the injection of technology through micro-financed schemes. Available studies such as Eboh (2002), Ezenwe *et.al*. (2001), Adeboye and Clark (1995) were largely concerned with identifying the determinants of technological accumulation and technological learning with no indication of how technology can be injected into firms through market-based policies. This study was intended to contribute information about policies to guide the technological upgrading of firms by microfinance schemes in the country. Accordingly, the objective of the study is to determine the effects of the

policies of microfinance institutions on the accumulation of technological capability by their small-scale operator-clients. This study is crucial to the realization of one of the objectives of the New Microfinance policy in Nigeria (CBN, 2005: p. 9), which seeks to "promote synergy and mainstreaming of the informal sub-sector into the national financial system". This is because a clearer elaboration of the policy constraints and opportunities in the non-governmental organization MFI sub-sector would promote interventions for the eventual up-scaling of these institutions to Microfinance Banks. Moreover, one of the strategies under the new microfinance policy is to "promote the establishment of NGO-based microfinance institutions" (CBN, 2005: p. 9).

The paper is structured as follows. Following this introduction, section two presents a review of the literature on microfinancing and technological capability; while section three discusses the methodology adopted. Section four presents the results and recommendations, while section five concludes.

II. Literature Review

II.1 Conceptual Issues in Micro-Financing for the Poor

The concept of microfinance is best captured in the title of the book by F.A. J. Bouman (1990) – "Small, Short and Unsecured". Microfinance started as micro-credit which is the provision of very small loans that are repaid within short periods of time, and is essentially used by low-income individuals and households who have few assets that can be used as collateral. Microfinance is defined as the financial products and services that are targeted towards the poor (Mirero, 2004). It is the target to which the finance is directed that differentiates it from other financing schemes. At present microfinance includes such services as micro-credit provision, micro-savings/other deposit instruments, micro-insurance and money transfer. Consequently, microfinancing refers to the business of accessing or providing financial services to the poor. The poor are defined here as those who require financial services but lack accessibility to conventional services providers like commercial banks for reasons such as (i) lack of

conventional collaterals to secure loans; (ii) failure to meet minimum terms and conditions required for opening and operating different bank accounts; (iii) physical inaccessibility of banks due to their location in far away distant urban centers; and (iv) inappropriate services provision documentation and tools for microenterprise operators.

The aspect of microfinance that has contributed most to its growth and popularity is its "credit-plus" approach. Under this approach the focus is not only on the provision of adequate and timely credit to low income operators, but there is an attempt to integrate credit with other developmental activities such as community organizing and development, leadership training, skills and entrepreneurship development, financial management, and social mobilization (www.gdrc.org/virtual library; Oji, 2006). In most cases the success and sustainability of micro-finance schemes have depended upon, and were fostered by these other aspects.

Most low income individuals lack access to commercial bank loans for several reasons. In such circumstances, access to microfinance services affords low-income groups the opportunity to obtain loans for their economic activity. Microfinance services are usually tailored to the needs of the poor. Programs and organizations that provide credit to low income groups often have to make a clear match between the quality and quantity of credit, and the capacity and ability of the poor to utilize the credit, and at the same time being organizationally sustainable. Thus, the loans have to be tailored to the needs, capacities and abilities of the poor. This is unlike government credit programs and formal bank credit that emphasize large loans for long repayment periods at low interest rates. Microfinance loans, on the other hand, are for short periods, repaid quickly, and made available at interest rates that keep the program sustainable and viable.

II.2 Role of Microfinance Institutions (MFIs)

Microfinance institutions are generally regarded as institutions whose *major* business is the provision of microfinance services. By definition, microfinance institutions (MFIs) are semi-formal, non-governmental and community development organizations involved in rural development (Mark, 2001). They render both financial (credit) and non-financial services to their

members, mainly the rural poor, who are usually women. They are legal entities and are mostly registered as not-for-profit companies limited by guarantees. Consequently, they can sue and be sued under their name. They usually have Board of Directors or Board of Trustees as the case may be. These Boards comprise either only the founders or elected member delegates to the board. With respect to their services, they are involved in savings mobilization and loans. Their loanable funds are in high demand and constitute the main source of revenue for the organization.

Microfinance institutions offer microfinance services to the poor. By definition microfinance is the supply of loans, savings, and other basic financial services to the poor (Robinson, 2001). The size of the loan is usually small and varies from one institution to the other. In Nigeria the size is usually in the range of x5,000 to x50,000 (about: $35 to $350) (Oji, 2005). The type of enterprise involved and the market or population, to a large extent, determine the actual size of loans. Savings mobilization requires either a banking license (which none of the NGO MFIs have) or the status of a primary or secondary society (which are legally permitted to mobilize savings from members only).

Most MFIs operate outside the legal regulatory framework. The repayment rates of MFIs are generally considered high and within acceptable limits, and in some cases as high as 90 % or more (Rashid and Choirdhory, 2001). Their viability is sometimes enhanced by the substantial donor funds received. The dominant MFIs in Nigeria are The Farmers Development Union (FADU), Ibadan, Oyo State; Country Women of Nigeria (COWAN), Ondo State; Justice Development and Peace Commission (JDPC), Ijebu-Ode, Ogun State; NALT-United Self-Help Organisation (NUSHO), Nsukka, Enugu State; Development Exchange Centre (DEC), Bauchi, Bauchi State; Lift Above Poverty Organisation (LAPO), Benin City, Edo State; Save and Produce (SAP), Jos, Plateau State; Peace Development Centre (PDC) Uyo, Akwa-Ibom State; Self-Reliance Economic Advancement Program (SEAP), Ilorin, Kwara State; and Outreach Foundation (OF), Lagos, Lagos State (Onyeagocha, 2004). All the MFIs listed above participated in the UNDP Microstat (Nigeria) program with the exception of COWAN and FADU. The Microstat Global pilot program was initiated by UNDP because of the huge demand for microfinance services.

Globally it is estimated that about 500 million households have demand for microfinance services and only about 2.5% of these are currently reached by microfinance programs (Rhyne and Donahue, 1999). In order to meet this global demand, countries were encouraged to set up micro-stat projects. Furthermore, new institutions were encouraged to initiate services, while young and promising institutions are encouraged to scale up their activities. The aim is ultimately to build a new generation of MFIs with solid institutional base, financial performance and transparent track record. The UNDP MicroStat Nigeria program started operations effectively in September/October, 2000 (Onyeagocha, 2004).

The Self-Help Groups (SHGs) which perform similar functions as the semi-formal institutions are also microfinance institutions but are classified as informal microfinance institutions. The formal MFIs include the Development Finance Institutions (DFIs), Community/Microfinance Banks (CBs) and commercial banks. Consequently there are four types of MFIs, namely, the non-governmental organization (NGO) MFIs, government-supported MFIs or Development Finance institutions, Private sector-operated MFIs such as commercial and community/microfinance banks and Co-operative societies, and informal sector MFIs or SHGs.

Although several organizations are involved in microfinance activities, the definition of micro-finance institutions adopted in this work is that MFIs are semi-formal, non-governmental and community development organizations involved in rural development by rendering both financial (credit) and non- financial services to their members, mainly the rural poor. They are legal entities and are mostly registered as not-for-profit companies limited by guarantees. This definition tends to exclude the informal self-help groups whose activities and policies are un-coordinated and may even be difficult to identify. It also excludes the microfinance activities of development finance institutions (DFIs) and private-sector operators such as commercial/community banks because their objectives are not primarily to serve the poor and their policies are not independent of the heavy regulation imposed by the financial system. *This definition helps us to focus on institutions that were primarily set up to help the poor and whose policies are independent of the financial system*. This focus is important in order to avoid

confusion between the effect of Microfinance institutions' policies, and those of their regulators. It is within this context that we can assess the effect of MFI policies on their borrowers.

Rogally (1999) defined micro-credit as credit for self-employment, which is designed to enable the poor to have access to production capital. This is based on the premise that micro-credit will lead to investment, income, reinvestment and more income until the borrower is promoted out of poverty. Effective micro-credit policies are necessary to facilitate the transformation of microfinance schemes from subsistence living level of support (or micro-enterprises) to small-scale enterprises (SSEs) level of support. SSEs operators if appropriately supported have greater potentials for income generation and employment creation compared to micro-enterprises (MEs), and are therefore critical for the effective fight against poverty through financial intervention strategies and services of MFIs. The nature and level of financial services required by micro-entrepreneurs differ from that required by small to medium scale (SSEs to SMEs) entrepreneurs. While MEs mainly need working capital loans to increase business turnover, the SSEs/SMEs require both capital and fixed assets loans for production purpose. It is at the level of SSEs/SMEs that the linkages to appropriate technology in terms of production equipments/tools will make significant contributions to the fight against poverty through enhanced income and employment from SSEs/SMEs.

II.3 Technological Capability of Small Scale Firms

Technological capability refers to the ability of firms to make effective use of the technological knowledge in production, investment, and innovation. They are the capabilities needed to execute all the technical functions entailed in setting up, operating, improving, expanding, and modernizing the firm's productive facilities. (Oyelaran-Oyeyinka, 2003). They represent the complex of entrepreneurial, managerial, and technical skills needed to set up and operate industries efficiently over time. Thus, technological capabilities refer to the ability of firms to use existing technology to produce more efficiently, and to use the experience gained in production and investment to adapt and improve the technology in use.

According to Aw and Batra (1998) technological capability refers to the ability to adapt or assimilate technology imported from abroad and to incorporate the additional and distinct resources needed to manage and put to productive use the newly acquired technology. These additional resources include skills, knowledge, experience and institutional structures and linkages. Consequently, various authors have distinguished between different types of technological capabilities. In his taxonomy Lall (1990; 1992) proposed three main groups of technological capabilities of the firm notably: investment, production, and linkage capabilities. Investment capabilities are understood as the skills required to identify, prepare, design, set-up, and commission new investment projects, and the expansion of existing ones. Production capabilities cover all the skills required to run a plant efficiently and to improve over time. They involve three broad types of engineering functions, namely: process, product, and industrial functions. Linkage capabilities are the skills needed to transfer technology from one firm to the other (who may be suppliers, buyers, or competitors), or from service firms to manufacturing firm, and from the science and technology infrastructure to the industry or firm. In essence they are the skills required by the firm to take advantage of improved technological opportunities from other firms, from service providers (including credit providers), the industry, or from the national science-and-technology system.

Based on their studies of industrial dynamism and the resources needed to generate and manage it, Bell and Pavitt (1993; 1995) presented a more detailed classification, which makes a distinction between *production capacity* and *technological capability* as representing two different stocks of resources. To them, production capacity are the resources used to produce industrial goods at given levels of efficiency and input combinations while technological capability refers to the resources needed to generate and manage technical change, including skills, knowledge and experience, institutional structures and linkages. They also made a distinction between technical change and technological learning or accumulation. While the former encompasses any way in which new technology is incorporated into the production capacity of firms and economies, the latter refers to any process by which the resources for generating and managing technical

change are increased or strengthened. The fundamental difference in Lall's and Bell and Pavit's classifications appears to be in the time dimensions of the conceptions of technological capabilities. Lall was interested in the static concept of capability, while Bell and Pavit were more concerned with the dynamic aspects of technological capability.

Another important taxonomy of technological capabilities in the literature is that proposed by Ernst et al (1998). These authors defined and classified technological capabilities in six types of functions with great variety of knowledge and skills positioned as the core elements, which firms need for them to acquire, assimilate, use, adapt, change and create technology. These functions with their associated sequential order of priority are as follows: production capabilities, investment capabilities, minor change capabilities, strategic marketing capabilities, linkage capabilities and major change capabilities (Oyelaran-Oyeyinka, 2003). An important denominator to all these conceptions of capability is that they all refer to *knowledge, skills,* and *experience* as core elements of technological capability.

II.4. The Effect of Policies on Technological Capability

The major policies that can impact on technological capability of firms include: firm level policies; policies of service firms/suppliers; industry-level or sectoral policies; and infrastructure policies of government. The firm level policies are the policies set by the firm itself to guide her operations and activities. Some firm-level policies can encourage or discourage technological accumulation. Oji (1989) stated that a firm that discourages the operation of shift-work may have lower levels of capacity utilization and, hence, technological accumulation relative to others. Similarly, a firm with a policy of out-sourcing of repairs and maintenance of equipments and facilities may risk the slow growth of her innovation and investment capabilities relative to others that utilize their staff (and facilities) to provide these services.

The policies of service firms and suppliers refer to those of firms that provide inputs, credits, spares, maintenance, repairs, and other services to the firm. This is where the policies of Microfinance institutions are

important. The policies of such service firms and suppliers in their dealings with the enterprise may constrain or promote the growth of technological capability. With respect to credit, Massaquoi (2004a) stated that there are two types of credit policies relating to the informal sector, namely those that favor working capital and those that favor fixed capital loans. This categorization is valid with respect to both the quantum of funds available and the rate of interest. The study observed that a credit system (for example, a microfinance loan to clients) that does not favor fixed capital has the following positive effects on technological capability of borrowers: the encouragement of more careful investment in machinery; forces the operator to take greater care of available machinery through skilful use and carefully planned maintenance programs; makes the operator to be more innovative and more willing to undertake technological adaptations. The result of these will be an increase in firm's proficiency in investment, and her innovation and production capabilities. However, the major disadvantage of credit policy that does not favor fixed capital is that it may not facilitate the introduction of new hardware, and could constrain expansion activities, thereby limiting investment capabilities(Massaquoi, 2004a).

Industry-level or sectoral policies represent industry-wide or government policies for the particular industry or sector. They include regulatory policies, support institutions and infrastructure, industrial standards and professional requirements (Oji, 2005). Bell and Pavitt (1993) stated that a major government contribution to technological accumulation is its investment in education and training. Massaquoi (2004a) stated that government policy on support institutions and infrastructure for the informal sector is usually to provide (or establish institutions that provide) formal training in managerial and financial skills. However, such training is not likely to contribute to the production and innovative abilities of informal sector operators who are often the targets. To have any meaningful impact of technological capability, training must be directed at technical skills acquisition by the operators. Formal training in crafts and skills can be delivered through vocational educational centers or programs. Unfortunately, these centers are often equipped with expensive imported machinery, which the trainees may not be able to afford after training. It is

more likely that on-the-job training through apprenticeship systems and internships may exert more beneficial effects of technological capability development (King, 1984).

The policy on provision of adequate infrastructure for the informal sector relates to the clustering of all like-operators in a specific zone or industrial area (Massaquoi, 2004a). Although initially this policy may lead to the separation of informal sector operators from their markets, it is however likely to have beneficial effects on the accumulation of technological capability among the clustering firms in the long run. This is because competition among the firm clusters in a particular zone would stimulate innovation and product improvements. Even where the firms become unionized, clustering promotes organized competition and competitive co-operation which engender institutional innovation and linkage capabilities. Also, there would be rapid transfer of skills and knowledge among the clustering firms, which promotes production efficiency. Furthermore, such clustering may lead to process specialization and interdependence among firms in the industry in the production of particular products (Mytelka and Tesfachew, 1999). This leads to the development of linkage capabilities.

III Methodology

III.1 Sampling Procedure

The sampling for this study was done along the major geographical regions of Nigeria namely the North, the South-West, and South-East regions. A list of the registered MFIs was obtained from the UNDP MicroStat Nigeria Program, along with some other information from reconnaissance surveys. The list of MFIs compiled was stratified according to their region of operation. Initially, three MFIs were randomly selected from each region to make a total of nine MFIs for the study. The eligibility criterion for the selection of MFIs is that at least 10% of the clients are engaged in technology-using enterprises. One of the MFIs initially selected from the Northern region was later dropped because during the survey almost 99% of its clients were engaged in trading activities, which uses little or no

technology. It was substituted with another MFI from the Eastern region of the country. Thus the distribution of selected MFIs is as follows: North (2), East (4), West (3), making a total of 9 MFIs.

For each selected MFI a list of the technology-using micro-borrowers with at least 6 months relationship with the MFI was obtained from them. Thirty micro-firms were randomly selected from each MFI to make a total of 60 respondents from the North, 90 respondents from the West, 120 respondents from the East, or 270 respondents for the entire study. The selected respondents were interviewed during field surveys by well-trained research enumerators, most of whom were seasoned university academics. In addition, the selected MFIs were interviewed using a separate set of questionnaire and Focus Group Discussions (FGDs). However, only 250 of the clients' questionnaires were adjudged to be usable for the analysis.

III.2 Data Collection Methods and Instruments

The method of data collection and the instruments/variables adopted for this study followed the methodology developed by the UNESCO Expert group on the Transformation of the activities of clients of MFIs (Massaquoi, 2004b; Oji, 2005). The methodological frameworks later elaborated by UNESCO (2004) are that several factors were identified as linkages between policy and technological capability. The linkage factors were separated into two: those aspects of policy that influence technology acquisition and transfer (i.e. the determinants); and those that show the level of technological capability (i.e. the indicators). These factors and their origin (i.e. government policy, MFI policy, etc) were elaborated in a framework (see: Oji, 2005). Under the framework, the indicators of technological capability were grouped to show how they can be used to determine the levels of technological capability and the components of the existing capability (i.e. hardware, software and ergo ware).

This methodological framework guided the development of the data collection process, instruments and plan for the study. In consequence, the research considered any of the following factors as indicators of technological capability: changes in production level, productivity,

profitability, competitiveness, age of machines, automation, skill level, new products, product quality, evidence of reverse engineering, design capability, equipment learning, etc.

III.3 Data Analysis

Two technological capability regression models were run. First, to assess the determinants of technological capability of borrowers, an ordinary least squares regression was estimated with the dependent variable as technological capability of clients (TCap) which was constructed as a composite index consisting of the following technological indicator variables: firm's assessment of the extent of its growth in output, improvement in quality of product, adoption of new technology, adaptation of equipment, new product development, firm's competitiveness, and improvement in workers skills.

This composite indicator of technological capability (or technological capability index) was regressed against the following independent variables: age of firm owner (X_1), number of workers/employees (X_2), length of experience in the business (X_3), loan amount (X_4), loan duration (X_5), loan interest rate (X_6), education of respondent (years of schooling) (X_7), regular scale of production per annum (N) (X_8), age of machinery (X_9), appropriateness of equipment/machinery to production needs (X_{10}), appropriateness of equipment/ machinery to workers' skill level, and available infrastructure (X_{11}), and current value of firm's investment in machinery/equipment (X_{12}).

$$\mathbf{TCap = f(X_1, X_2, \ldots X_{12})} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \mathbf{1}$$

Where: **TCap** = Technological Capability index (a **Composite variable**)

X = Age of firm owner (years)
X^1 = Number of workers/ employees
X^2 = Length of experience in the business (years)
X^3 = loan amount (N)
X^4 = loan duration (months)
X^5 = Loan Interest rate (%)
X^6 = Education of respondent (years of schooling)
X_7

X_8 = Regular scale of production per annum (N)
X_9 = Age of machinery
X_{10} = Appropriateness of equipment/machinery to production needs (index)
X_{11} = Appropriateness of equipment/machinery to Workers' Skill level, and Available infrastructure (index).
X_{12} = Current value of firm's investment in machinery/ equipment (N).

IV. Results and Discussion

IV.1 Characteristics of the Microfinance Institutions (MFIs)

This section presents the characteristics of the MFIs that participated in the survey. The states in which the offices of these MFIs were located constituted their primary area of operation. However, most of the MFIs had branches in other states. The branch spread was between 3 and 28 states, with a mean of 5 states. Establishing branches in several states enabled the MFIs to expand their clientele base in response to the rising demand for their services. In terms of experience, majority of the MFIs had been in the business for 10 to 20 years. The oldest MFI, was established 23 years ago, while the youngest, was only 7 years old in the business. The length of business experience is important in micro-financing. Older and more experienced MFIs are expected to have larger client base, have accumulated more savings and made more loans, and have wider range of services and products, in addition to more targeted and client-focused delivery mechanisms. Also, older MFIs would more easily appreciate their clients' needs for technology, networking, information and services to improve clients' operations.

The MFIs had a total of 341,447 clients, whose total savings with the MFIs in the last five years amounted to about x625 million (Table 1). Also, during the same period the loans made by the MFIs to their clients amounted to a cumulative value of about x1.69 billion. In terms of clients distribution in the last five years, about 76 % of the clients were engaged in trading,

16% were into production and processing activities, while the remaining 8% were engaged in other sundry activities especially services and repairs.

The predominance of trading activities among MFI clients reflected their preference for quick-yielding and short-term activities to enable early loan repayment, and minimize default. This is an important feature of non-collateral borrowing which these MFIs practice. It is also an important device to monitor the loan as early as possible and to avoid diversion. However, the use of technologies and the problems with it is not easily manifested in simple trading activities. Very little or no technologies are required for simple trading enterprises. Therefore, our concern is largely with the MFI clients that are engaged in production, processing, services and other activities that involve the use of technologies. Although trading enterprises may not display hardware capabilities, they are like other enterprises, involved in the utilization of software and ergo ware capacities resulting in the development of strategic marketing and linkage capabilities (Ernst et al, 1998) .It is also possible that the greater risks involved in production and processing enterprises and the associated need for a waiting period before production matures (or moratorium) may have contributed to the adverse selection of these clients by the MFIs.

In the last five years, there has been a significant growth in the clientele, savings and loans made by these MFIs. Table 2 shows that between 2001 and 2004, the number of clients increased from 36,417 to 341,477. This reflected increasing demand for microfinance services. During the same period, the volume of savings accumulated by the MFIs from their clients rose from about x63.917 million to x295.847 million. Also the volume of loans made to clients by the MFIs increased from x182.109 million in 2001 to x652.804 million in 2004. Increased funding and donor support are required to meet this rising demand for microfinance services. This observation is in agreement with the complaints by most of the MFIs that one of their key problems is the need for more funding sources to meet the rising demand by their clients. However, any donor support should be properly structured preferably along the lines of a revolving loan fund, in order not to compromise the financial and operational sustainability of the MFI, when the funding dries up.

Three categories of loans were given by the MFIs, namely short-term, medium-, and long-term loans. The short-term loans were given for a period of 3 months, the medium-term loans lasted for a maximum period of 6 months, while the long-term loans lasted for one year (Table 3). In practice, the actual duration of these loans depended on the enterprise and the purpose for the loan. Most medium-term loans were for 4-6 months, while long-term loans lasted for 8-12 months. The interest rates on most MFI loans were between 30%- 36% per annum, while the maximum loan size was about N 15,000, and the minimum was between x5,000 to x7,000. The MFIs had an average repayment rate of about 95%.

IV.2 Characteristics of the Micro-Borrowers

The enterprises surveyed were mostly in the informal sector. They were engaged in a broad range of activities including production of goods, repairs, sewing and rendering of sundry services. Table 4 shows that a greater proportion of the respondents, about 36% were engaged in food processing/trading followed by farming, 23%. About 11% of the respondents were engaged in service activities such as mechanics/repairs, garments/ textiles sewing and carpentry. The predominance of food processing/trading and farming enterprises in the sample was expected because microfinance is largely directed at the poor; and most of the poor are primarily engaged in agriculture-related activities. Agriculture and related activities including processing of food products and petty trading provide reliable medium for subsistence and economic participation by the poor. Moreover, the resource requirements including initial capital and technology for embarking on these enterprises are very low. Similarly, the repair activities have limited initial resource and set up requirements. Given the low resource requirements for theses enterprises, it was expected that the ownership and management requirements would be simple. About 85% of the micro-firms were sole-proprietorships or family businesses; while 8% were partnership businesses (Table 4). Sole-proprietorship or family businesses offer the distinct advantage of flexibility in managing the enterprise which these micro-businesses really need. It also offers the advantage of integrating family and business decisions to promote effective management of household resources and objectives.

The average age of the owners of these micro-firms was 42 years, and most of them had undergone pre-business apprenticeship for a period of about 1.4 years. These owners have been operating their enterprises and accumulating the necessary experiences for a period of about 10 years. Figure 1 shows that a majority of the operators, about 83% were females, while the remaining 17% were males. This finding is consistent with other studies such as Alter *et al* (2002) and World Bank (2002) who observed that most microfinance borrowers are women. Simply on account of this, Ihenduru (2003) stated that microfinance is increasingly becoming a strategy for women empowerment.

IV.3 Effect of Policies on Technological Capability of Micro-Borrowers

It is important to identify what policies influence the growth or accumulation of technological capability of micro-firms. The regression results to assess the determinants of the technological capability of micro-borrowers are presented in Table 5. The estimated F-ratio of 14.07, which was significant at the 1 percent level and a low standard error of estimate, indicated that the model provided a good fit to the data. Also, the adjusted R-square indicated that 54% of the variability in the dependent variable was explained by the included regressors.

The regression results show that the technological capability of the micro-borrowers was positively and significantly explained by the number of employees/workers, duration of client's loan, age of major machinery/ equipment of the enterprise, and the degrees of appropriateness of the machinery/equipment to workers' skills, and available infrastructure. Other things being equal, an increase in the number of workers/employees would lead to the accumulation of greater technological learning if the work environment promotes a culture of team approach to task execution. Increased technological learning, improves the long-term efficiency and profitability of the enterprise. Most production machinery are operated by more than one employee, and often in turns or by shift-work arrangements. It is, therefore, likely that the micro-borrowers employed team approach to executing the tasks of their enterprises.

Also, an increase in the duration of client's loan increases the technological capability of borrowers. This is also expected as loans increase the capital base (and assets) of the borrower particularly if they are used to finance capital spending. Thus, the longer the loan is productively used the greater the production capability of the enterprise. Short-duration loans have the tendency to disrupt the operations (and capital structure) of firms because of the frequent need for repayments.

Similarly, the age of the major machinery of borrowers was positively and significantly related to the accumulation of technological capability. This is expected as worker's/operator's skill improves with greater familiarity and mastery of production equipments/machinery which increases with the age of the machinery. However, this is true as long as technological obsolescence and depreciation has not rendered the equipment inefficient or dysfunctional.

Also, the extent of appropriateness of machinery/equipment to workers' skills and available infrastructure are expected to be positively related to technological capability of firms. Appropriateness of equipment to workers' skills and available infrastructure promote efficiency in the use of technology, which invariably leads to worker dexterity and technological learning over time. Similarly, the appropriateness of equipment to available infrastructure such as electricity and water supplies, roads and transportation systems and traditional systems of rules and institutions would lead to development of technological capabilities that are appropriate to the context and local business environment. This is important because sustainable technological capability must be appropriate to the business environment of the micro-operators.

However, the technological capability of firms was negatively but significantly related to the length of experience of the operator and interest rate on the loan received from the MFI. It is expected that operator's technological accumulation would increase with experience, but this negative relationship is an empirical matter. It is possible that the length of business experience was indexing a latent variable, perhaps the age of the enterprise owner. The age of the owner of the enterprise was itself

not significant. Adoption studies have shown that younger farmers are more likely to adopt improved technologies than older farmers (Oji and Onoja, 2002). As expected the interest rate on the loan received from MFIs was negatively and significantly related to technological capability of borrowers. High interest rates may not encourage the acquisition of fixed assets, including machinery, equipments, and tools, which promotes technological accumulation of borrowers as lenders want to recoup their investments faster; while lower rates are likely to encourage the acquisition of equipments and tools. The key message here is that MFIs should reduce their lending rates or spread the interest payments in such as way as to promote greater use of the loan by the clients. It is possible that interest rates may be proxying for non-interest charges also. MFI should also reduce their non-interest charges or get this paid from the interest accruing from clients' savings. In order to encourage technological acquisition, MFI can categorize their loans into low and high interest loans. The conventional lending to clients can be maintained as "high interest" loans for working capital, while loans for capital assets or technology acquisition should be developed as "low interest" loan products. Such loans can be secured by a mortgage over the fixed asset so acquired by the micro-borrower. The low interest loans for capital assets/equipment acquisition can by funded as on-lending schemes based on donor support under revolving loan fund model or loans from development finance institutions at concessionary interest rates.

V. Conclusion

Microfinance is a development tool. A good microfinance policy should aim at enabling the poor to increasingly move out of poverty through cycles of loans and repayments. Such policies should focus on growing the technological capabilities of MFIs clients. The MFI policies and good practices identified and recommended by this study include: First, the MFIs should increase the duration of clients' loans, (or spread the repayment over a longer period, and increase the moratorium). Second, reduction in MFIs' lending rates, and introduction of fixed assets loan products. Third, the MFIs should assist clients to prepare their business plans as well as provide them with training on credit utilization. Finally,

the MFI can categorize their loans into low and high interest loans; with conventional lending to clients maintained as “high interest” loans for working capital, while loans for capital assets or technology acquisition should be developed as low interest loan products and financed through donor-supported revolving loan fund model.

A good policy environment is required to support the technological upgrading of micro-borrowers.

Appendix

Table 1: Some Characteristics of Surveyed Microfinance Institutions, Nigeria, 2005

MFI Name	Clients 2004	Total Savings, 2001-05 (x)	Total Loans Value, 2001-05 (x)	Clients Distribution		
				Trading%	Production%	Others%
DEC-Enugu	3750	40,000,000	163,000,000	94	6	0
NALT-NUSHO	7207	45,631,943	126,473,721	60	40	0
COWAN	260,000	118,000,000	121,840,000	70	20	10
DEC-Bauchi	18,160	77,572,031	361,363,846	95	0	
LAPO	32,942	234,623,414	601,461,653	39	34	27
PDC	2,950	11,810,769	55,323,000	62	15	23
ADDS	1,600	7,350,000	100,700,000	95	5	0
JDPC	14,658	89,023,218	156,199,000	90	0	10
ASHO	180	1,234,000	4,843,000	80	20	0
TOTAL	**341447**	**625,245,375**	**1,691,204,220**	**76**	**16**	**8**

Source: Field survey, 2005/06.

Table 2: Growth in The Clients, Savings, and Loans Of Survey Microfinance Institutions

Year	Nos of Clients	%Change	Savings Volume (x)	Saving Growth (x)	Loans value (x)	Loans Growth (x)
2001	36417	-	63,917,574		182,109,665	
2002	51800	0.422	68,388,501	4,470,927	298,352,041	116,242,376
2003	64307	0.241	125,654,236	57,265,735	384,514,111	86,162,070
2004	**341477**	**4.310**	**295,847,332**	**170,193,096**	**653,804,712**	**269,290,601**
MAR.2005	275970	-0.192	71,437,732	-224,409,600	172,423,691	-481,381,021
TOTAL			**625,245,375**		**1,691,204,220**	

Source: Field survey, 2005/06

Table 3: Term Structure of Loans By Surveyed MFIs, Nigeria, 2005

Loan Type	Payback Period (Months)	Interest Rate, (%p.a, months)	Repayment Rate%	Size (₦'000)
Short-term (<3)	3	30-36	95-100	5-7
Medium (3-6)	4 - 6	30-36	95-100	8-10
Long (>6)	8 - 12	30-36	87-99.4	8-15
AVERAGE			**95%**	**8,000**

Source: Field survey, 2005/06

Table 4: Characteristics of Enterprises Surveyed

Type of Enterprise	Frequency	Percent	Cumulative Percent
Carpentry/Wood	7	2.8	2.8
Garment/Textile	18	7.2	10.0
Mechanic/repairs	6	2.4	12.4
Food processing/Trading	91	36.4	48.8
Farming	58	23.2	72.0
Soap/Detergent	23	9.2	81.2
Others	47	18.8	100.0
Total	250	100.0	
Ownership			
Sole/Family Business	212	84.8	85.6
Partnership	20	8.0	93.6
Private Company	11	4.4	98.0
Others	7	2.8	100.0
Total	250	100.0	

Source: Field survey, 2005/06

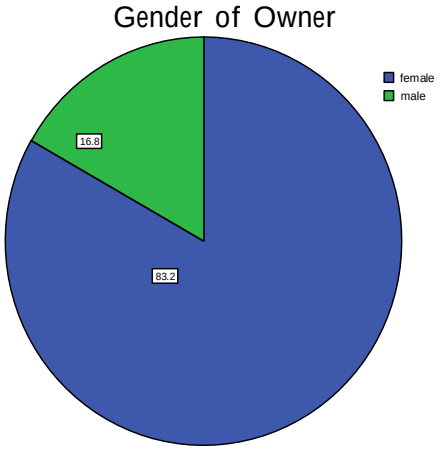

Fig.1: Gender of Owners of Enterprises Surveyed

Table: 5 Regression Estimates (Based on OLS) of the Determinants of the Technological Capability of Micro-Borrowers in Nigeria

Explanatory Variables	Coefficients	Std. Error	t-value	Sig.
Age of Owner	-.005	.005	-1.045	.298
Number of Employees/ Workers	.017	.008	2.040	.043
Length Experience in Business in Years	-.015	.006	-2.471	.015
Loan Amount (N)	-2.839E-07	.000	-.825	
Loan Duration in months	.121	.033	3.645	.000
Loan Interest Rate (%)	-.023	.007	-3.375	.001
Years of Schooling	.007	.006	1.168	.245
Scale of production per Annum (N)	-1.441E-08	.000	-1.101	.273
Age of machinery (years)	.038	.012	3.266	.001
Appropriateness of Equipment/ Mach to production needs	-.019	.052	-.355	.723
Appropriateness of Equipment/ Mach Workers Skill level	.377	.054	6.981	.000
Appropriateness of Equipment/ Mach to Available Infrastructure	.126	.040	3.161	.002
Current value of firm's investment in Machinery/ Equip(N)	6.479E-08	.000	1.327	.187
(Constant)	1.069	.359	2.975	.003

Statistics: F-ratio=14.070; R-square=0.59; R-Square (adj)=0.54; S.E= 0.5812; Source: Based on Field data, 2005/06

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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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JEL Classification Numbers: E5, E52, E44
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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:

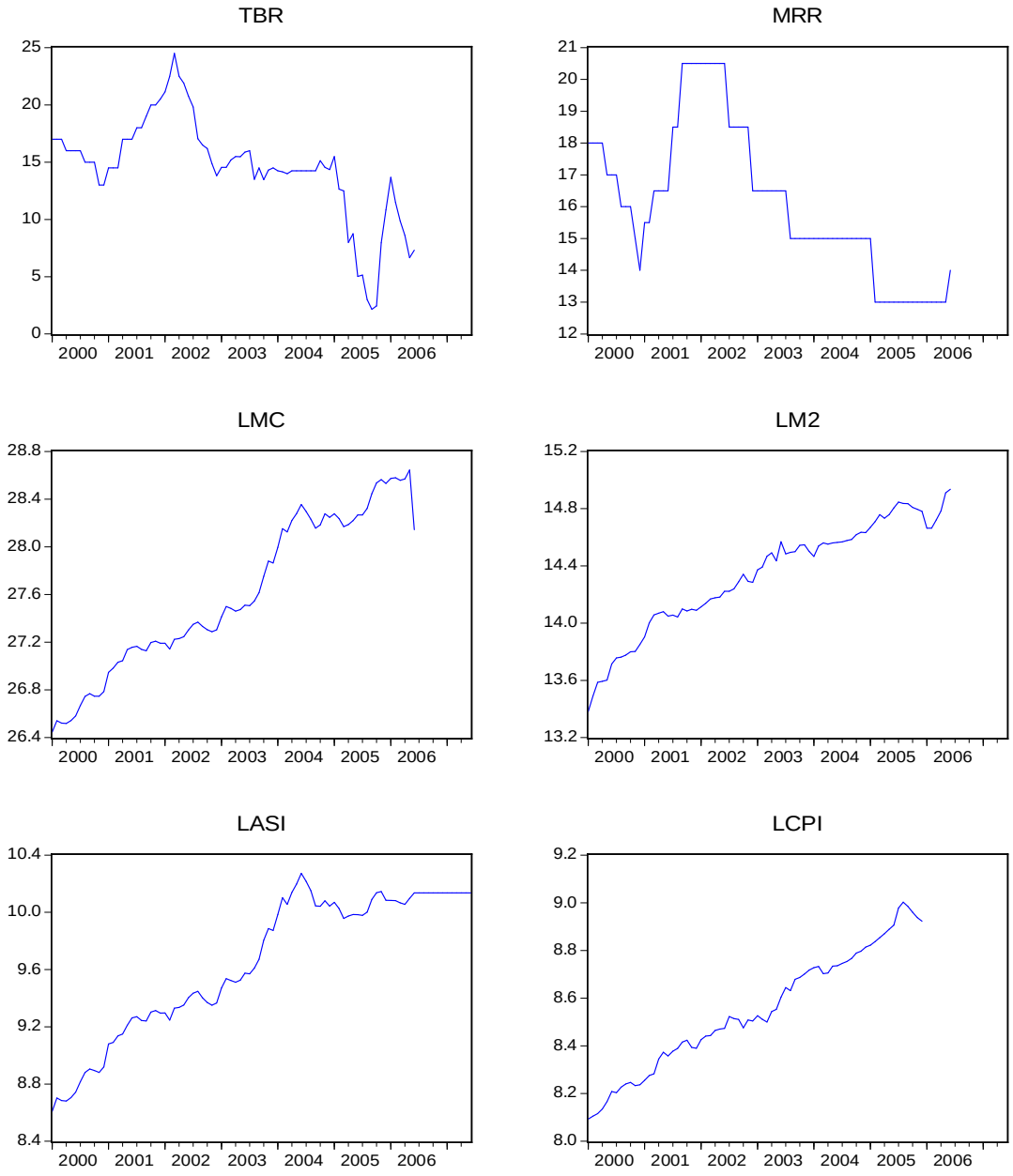
TBR
25
20
15
10
5
0
2000 2001 2002 2003 2004 2005 2006
MRR
21
20
19
18
17
16
15
14
13
12
2000 2001 2002 2003 2004 2005 2006
LMC
28.8
28.4
28.0
27.6
27.2
26.8
26.4
2000 2001 2002 2003 2004 2005 2006
LM2
15.2
14.8
14.4
14.0
13.6
13.2
2000 2001 2002 2003 2004 2005 2006
LASI
10.4
10.0
9.6
9.2
8.8
8.4
2000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

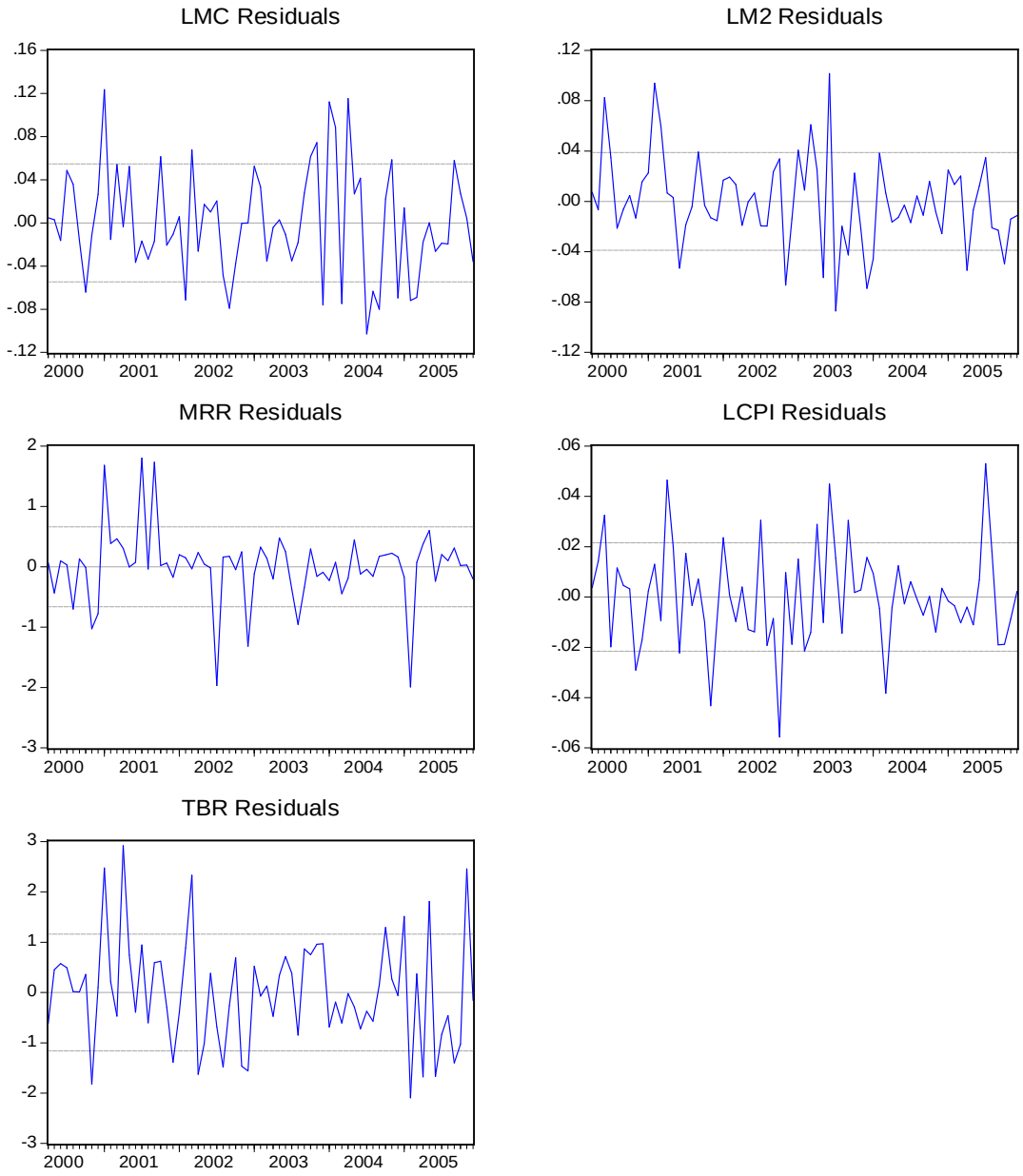

Figure 3: Impulse Response Function of All Share Index to all Variables

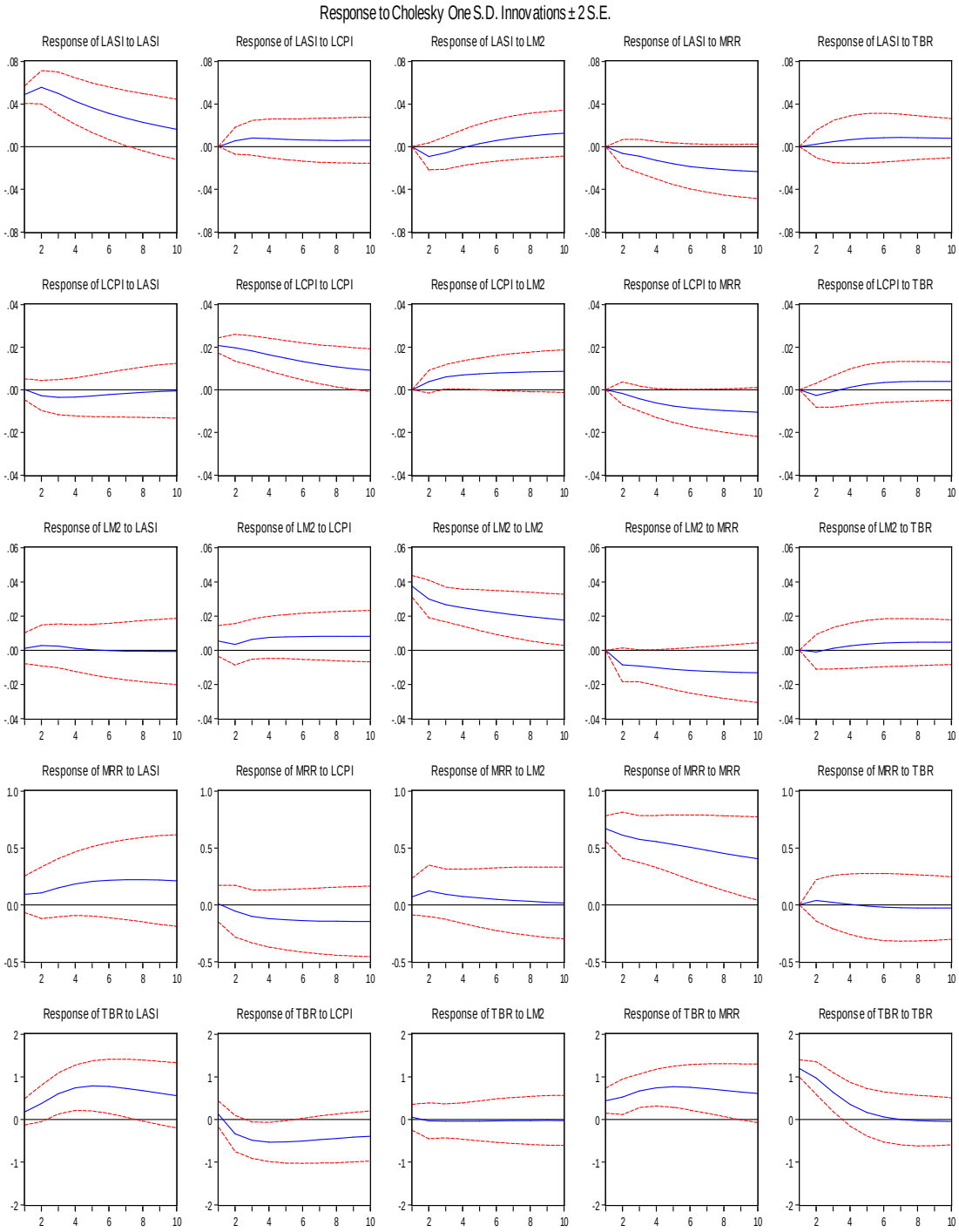

Table 5: Variance Decomposition of the Variables

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

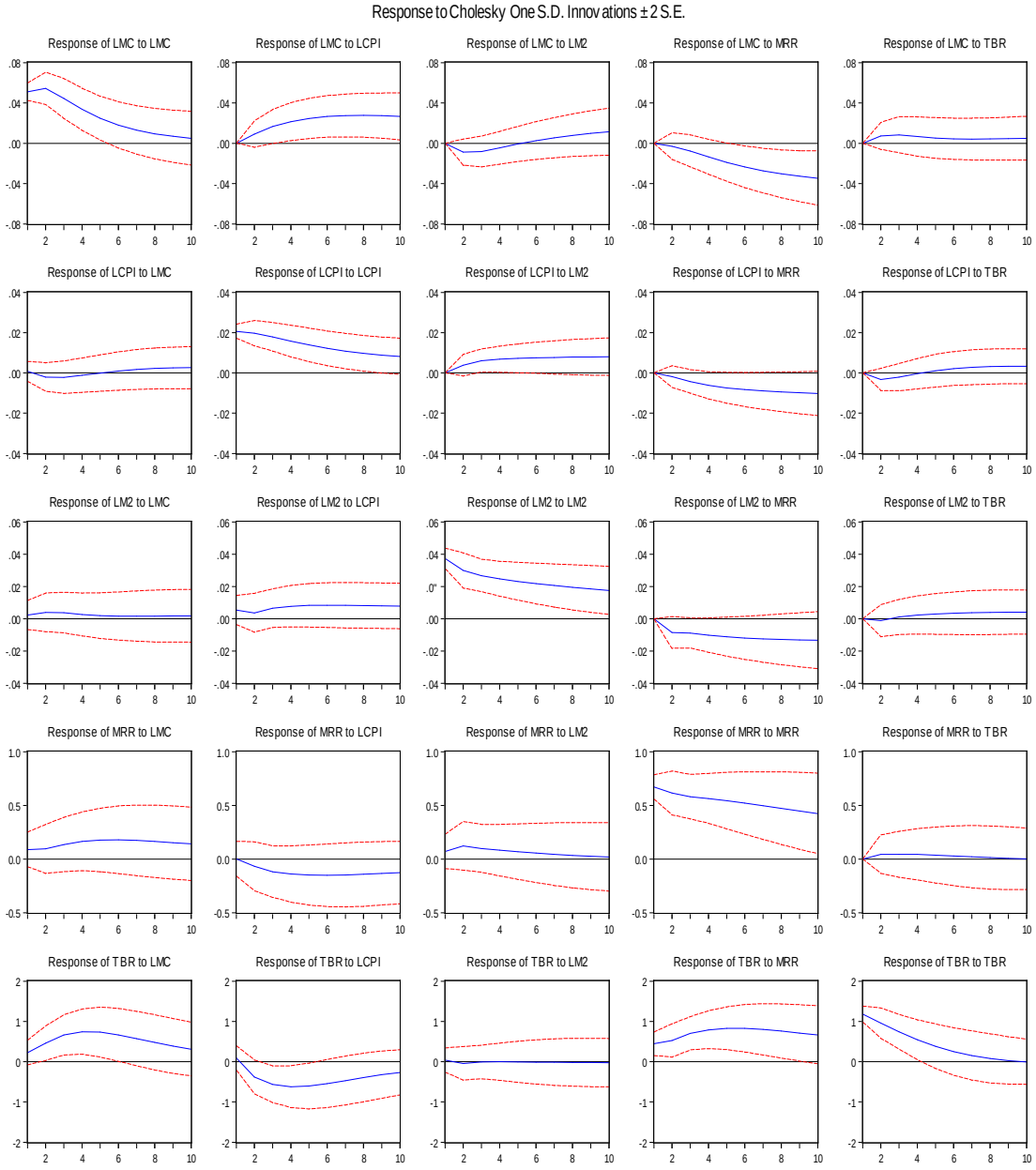

Table 6: Variance Decomposition of Market Capitalization

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

A Test of the Validity of Export-Led Growth Hypothesis in Nigeria: A Further Evidence

Olayinka Idowu Kareem*

This study tests the validity of the hypothesis of export – led growth in Nigeria. Several arguments have been adduced with respect to this hypothesis in the literature, while empirical studies for Nigeria had put forward different results based on the period of coverage and the methodology. Given that economic models perform better with large time series, this study has used the period from 1960 – 2005 with adoption of a neo – classical Cobb – Douglas production model that was estimated through both linear and log – linear least squares technique. The effects of shocks to the explanatory variables on economic growth were captured by the impulse response model, while the granger causality test shows the direction of causality in the model. The study found that both oil and non – oil exports contributed to the enhanced economic growth that the country witnessed, however, the oil export is more significant to economic growth in Nigeria. Thus, feedback causality exists between oil export and growth, while there is unidirectional causality that runs from economic growth to non – oil export. Furthermore, shocks to oil exports will significantly affect Nigeria's economic growth. Therefore, this suggest that an outward – oriented industrialization strategy through export promotion policies, should be embark upon by the government, especially those that will stimulate non – oil exports so as to averse the risk of negative oil export shock that would drop the level of economic growth.

Keywords: Exports, Growth, Impulse Response
JEL Classification: C22, F11, F43, O40
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I. Introduction

There has been a renewed interest in the study of export-led-growth hypothesis in the literature. The nature of the relationship that exists between exports and growth of national output has been debated in most of the recent development literatures, but little or no consensus is reached. The core of this argument is the question of whether economic growth as witnessed by some countries is usually driven by exports or that it is economic growth that leads to export performance.

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This question is pertinent in the sense that, establishing the causality between export and growth has a great implication for policy-makers' decision about the appropriate and relevant strategies and policies to adopt for economic growth and development. Although, the literature does not dispute that there is a strong correlation between exports and growth (see Medina-Smith, 2001), empirical evidences such as Kareem, (2005); Awokuse, 2003; Amavilah, (2002); Wadud (2000); etc have produced different results on the nature and direction of the causality between export and output growth. However, most of these studies focus on the causality between exports and output growth in the developing countries (Michaely, 1977; Balassa 1978; Chow 1987). Following the experience of the newly industrialized Asian countries, especially the Asian Tigers, e.g. Singapore, Taiwan, South Korea and Hong Kong whose rapid growth is usually attributed to their export expansion and promotion, most developing countries adopted the export promotion strategy (so as to experience similar level of economic growth). But, evidences have shown that while some had the expected growth others do not (Lee and Huang, 2002).

Nigeria, a developing country, had initially adopted an inward-looking development strategy called Import Substitution Industrialization Strategy (ISI), a strategy that aimed at replacing imported items with the locally produced ones, especially in terms of the use of local raw materials. After several years of experimentation, without the expected results, as importation especially that of capital inputs kept on increasing, the foreign exchange reserves was depleting. This led to a change of policy from an inward-looking strategy to the outward strategy called Export Promotion Industrialization (EPI) Strategy. This strategy is now pursued with the aim that it will translate into economic growth.

Furthermore, concerted efforts have been made and are still being made to encourage domestic production for exports. The Nigerian government has been making efforts to stimulate output in other sectors of the economy apart from oil sector so as to increase the number of products in the country export structure. Thus, the main objective of this study is to determine whether the exports-led growth hypothesis applies to Nigeria or not.

II. Justification of the Study

The notion that exports activity leads to economic growth has been subjected to a lot of arguments in economic development and policy circle for many decades (see Keesing, 1967; Krueger, 1985). The reason for these arguments was due to the unprecedented economic growth that the newly industrialized countries in Asia witnessed in the last two decades, which has propelled many developing countries to shift from inward-oriented economies to outward-oriented economies that allows for liberalization and opening of the economy. This is in line with the fundamental assertions of the theory of Comparative advantage, which allows for export-led-growth. However, as is traditional in economics science, a contradictory opinion that economic growth leads to the growth of exports (GLE) is also expressed, particularly for countries that are at their early stages of economic development.

Further, the export-led-growth hypothesis which is based on the assumption of unidirectional causality from exports to growth has been tested empirically by many development and international trade authors, including studies by Mrdalo (2004), Herzer, et al. (2004), Abu-Quarn and Abu Bader (2004), Abual-foul (2004), Awokuse (2003), Lee and Huang (2002), Medina-Smith (2001), Giles and Williams (2000) e.t.c. In Africa, similar studies include Kareem (2005), Okoh (2004), Lawanson et al (2004), Amavilah (2002), Olomola (1998), Oladipo (1998), Ekpo and Egwaikhide (1994), Egwaikhide (1989, 1992), Fosu (1990) Fajana (1979), Oyejide (1975), Hensley (1971). These studies were carried out to ascertain the applicability of the hypothesis to their various countries or regions.

However, while some of these studies supported export-led-growth hypothesis, i.e. Lawanson et al (2004), Awokuse (2003), Wadud (2000), Olomola (1998), Park and Prime (1997), Al-Yousif (1997), Ekpo and Egwaikhide (1994), Egwaikhide (1992), Sheehey (1992), Fosu (1990), Fajana (1979). Another empirical results show that the direction of causality is from growth to export growth therefore confirming the growth led export hypothesis (GLE); e.g. Abu-Quarn and Abu-Bader (2004), Herzer, et al (2004), Bhasin (1999), Ahmed and Kwan (1991), Jung and Marshall (1985) among others. While,

Kareem (2006), Ahmed and Harnhirun (1995), Kwan and Cotsomotis (1991), Chow (1987), etc. found a feedback relationship. These show that there has not been consensus as to the direction of causality in the export-led growth hypothesis.

Various methods had been used to carry out these aforementioned empirical studies, while some used OLS, Stationarity and cointegration tests; others test this hypothesis with 2SLS, 3SLS and Granger Causality. Further, while most of the studies used bi-variate analysis, recent studies made use of multivariate analysis that include the use of other trade variables to joint export and output (GDP). Some studies even study the causality between fiscal policy and growth, global integration and growth as well as globalization and growth.

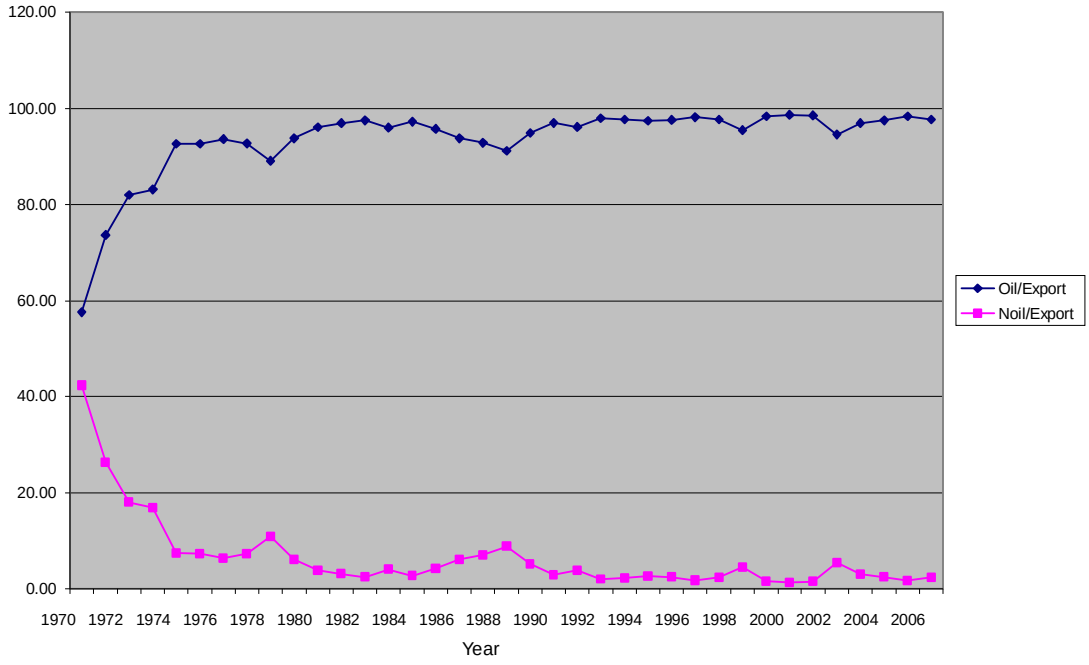
However, from the aforementioned studies we discovered that none of the studies as taken into consideration the effects of any shock to foreign exchange earnings from export as a result of shock in the international price/demand of the export, it is against this backdrop it becomes necessary to know what would happen to Nigeria's economic growth if there is shock to her exports earnings in international market. This gap we intend to fill in this study by introducing the methods of impulse response as well as the variance decomposition, in order to know the periodic effect of this shock on the economy. Granger Causality test will also be used in this study. These estimation techniques have not been combine in any known study in this area in the literature. Thus, the combinations of these analytical techniques serve as a more pragmatic way of testing export-led-growth hypothesis so as to eliminate any biasness and other estimation hindrances that might distort our findings.

III. Nigeria's Exports Performance

Before the oil boom of the 1970s, Nigeria's economy was mainly an agrarian economy; with the bulk of its foreign exchange coming from the sales of cash crops such as cocoa, groundnut, coffee, cotton and palm produce. However, following the discovery of oil and with the oil boom of the 1970s, crude oil then took over from agriculture as the major foreign

exchange earner for the country, constituting about 93 percent of the total exports between 1970 – 1985, rising to 96.8 percent by 1985 – 1996 and 99 percent by 2000 (Kareem, 2004). The share of oil export in total exports dropped to about 94.6% in 2002 due to a cut in the Organisation of Petroleum Exporting Countries (OPEC) supply quotas of which Nigeria was affected. However, the country's oil export share rose to about 95% in 2003 and by 2006, it has gotten to over 97%.

Figure 1: Share of Oil and Non-Oil Exports in Total Exports (%)



On the other hand, the share of non-oil exports in total exports declined from 7.0 percent in the period 1970-1985 to about 4 percent between 1986 and 1988. In 1990, the share of non-oil exports in total exports declined to about 3% and by 2000, it dropped to 1.3%. Though, it picked up to over 5% in 2002, but later fell to 2% in 2006. The decline recorded in the non- oil exports was due to the problems being encountered by the agricultural sector (e.g. inadequate government support, inadequate credit facility, e.t.c.), which was worsened by inappropriate pricing policies, a dearth of farm labor, caused by rural-urban migration, and infrastructural inadequacy in

the rural areas. The government made appreciable efforts to resuscitate the non-oil sector of the economy during the SAP era. Despite all the measures that were put in place, the performance of the non-oil export sector has remained dismal, as crude oil still remains Nigeria's major export.

Regarding the trend in the Nigeria's exports, table 1 shows that in the period 1970-1974, the country's average exports was x2.337 billion, this rose to x7.241 billion in 1975-1979 period. Nigeria's exports continue to increase in the period 1980-1984 with an average export of x10 billion, which later increased to x28.033 billion in the period 1985-1989 and got to x172.372 billion in 1990-1994. The export promotion strategy that was adopted during these period further yielded favourable result as the country witnessed increase in average exports between the period 1995-1999 to x1.088 trillion and in the period 2000-2004 it risen to x2.650 trillion. The enabling export policies of the government propel the country's export to x5.753 trillion in 2006. This trend shows that in absolute term, the value of Nigeria's total exports has been increasing overtime.

Table 1: The Average Nigeria's Exports from 1970-2006 (x' Million)

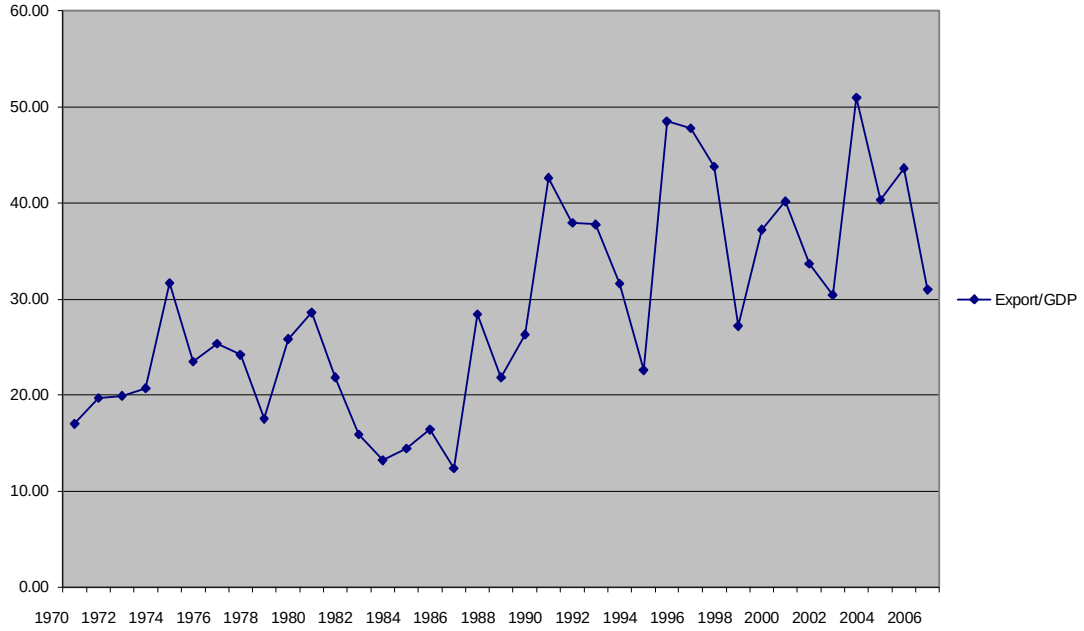
Year	Export	Oil	Non-Oil	GDP
1970-74	2337.24	1979.68	357.56	9654.62
1975-79	7241.7	6705.18	536.52	31124.28
1980-84	10001.38	9671.56	329.82	54274.86
1985-89	28033.2	26250.6	1782.6	122651.6
1990-94	172372.46	167871.5	4500.96	545029.82
1995-99	1088538.8	1062708.8	25830	2699095.38
2000-04	2649704.6	2578574.74	71129.82	6717311.38
2005	6372052.4	6266096.6	105955.8	14610881.5
2006	5752747.7	5619152.9	133594.8	18564594.73

Source: CBN Statistical Bulletin (Several Issues)

However, in terms of total exports share in the gross domestic products (GDP), as could be seen in figure 2, this share has been oscillating all through the selected years in this study. This means that Nigeria's export

contribution in the GDP has not been stable overtime, which might be due to changes in government export policies. For instance, in 1975 it share was about 24%, but by 1985, it has dropped to 16%, which later rose to 48% in 1995. Furthermore, in 2005, the share of total exports in the GDP has declined to about 44%, with a further drop in 2006 to about 31%. This trend shows that Nigeria's has to re-strategize and put in place appropriate export policies that would enhance and accelerate the export promotion drive, which has the potential of translating to sustainable economic growth and development.

Figure 2: The Share of Nigeria's Total Exports in GDP (%)



IV. Theoretical Issues

Export-led-growth hypothesis (ELGH) states that the expansion and promotion of exports is an important factor in promoting long-run economic growth. This hypothesis has been put forward as the rationale and efficient alternative to the import substitution strategy, that is, an inward-orientation strategy of development. The ELGH which is an outward-orientation development strategy is said to accelerate the level of total-factor

productivity growth (Ram, 1987, Kavoussi, 1984; Bhagwati, 1978; Krueger, 1978); encourages foreign direct investment (Balasu- bramanyam, et al., 1996).

The competition pressure in the global market may lead to improved product quality and force domestic producers to reduce inefficiencies. According to Bhagwati (1978) and Krueger (1978), the allocative inefficiencies of exchange control are likely to be reduced through foreign exchange liberalization, which is an important component of the export led growth strategy. The outward-oriented development strategy as a catalyst of growth has drawn a vast body of empirical research in the past three decades (Heller and Parter, 1978; Feder 1983; kavoussi, 1984; Jung and Marshall 1985; Chow 1987; Ram, 1987; Dollar, 1990; Fosu, 1990; Salvatore and Hatchar, 1991; Ekpo and Egwaikhide, 1994; Olomola, 1998; Bhasin, 1999; Wadud, 2000; Awokuse, 2003; Abu-Quarn and Abu-Bader, 2004; Mrdalo, 2004; Herzer, et al, 2004; Okoh, 2004; Lawanson et al, 2004; Kareem, 2005).

Therefore, the choice between inward and outward oriented development strategies for enhancing industrial development that would translate into growth and development is long standing. The former can be couched in terms of the infant industry argument, while the latter entails a neutral strategy with no bias against exports. There are very few exceptions in previous studies of export-led-growth that have not talked about the importance and role of other macroeconomic variables, such as investments, imports, exchange rate, energy etc.

There are several arguments that are put forward to justify the export-led-growth hypothesis in the literature. First, export growth indicates a rise in the demand for a country's output and, thus, serves to accelerate real output. Second, specialization in production of export products may be encouraged through export expansion and this might enhance the level of productivity and that of skill acquisition in the export sector. Verdoorn (1949) postulates that changes in productivity may lead to growth in the level of output. Further, according to Hart (1983), Ben-David and Loewy (1998), the outward oriented strategy might gives access to advanced technologies, better management practices and learning by doing gains,

which might lead to additional efficiency gain. Third, based on the study of Chenery and Strout (1966), an increase in exports may reduce the constraints to foreign exchange that would make it easier to import inputs to meet domestic demand, and so enhance output expansion. Thus, export promotion would erase the controls that arise from overvaluation of domestic currency.

The development of some goods for exports based on a country's comparative advantages may propel the exploitation of economies of scale that domestic markets are too small for optimal scale to be achieved while increasing returns may occur with access to foreign markets. The ELG may also be examined under product and industry life-cycle hypothesis. Economic growth is described under this hypothesis as a cycle that begins with exports of primary goods. Giles and Williams (2000) posit that economic growth and knowledge change the structure of the domestic economy, including consumer demand that propels the more technology intensive domestic industry to start exporting. As the domestic demand ebbs, there is increase in economic growth from the now technologically advanced exports. Lal and Rajapatirana (1987) opined that an outward-oriented strategy of development may provide improved opportunities and rewards for entrepreneurial activity that is assumed to be the key to extended growth.

However, the main focus of export-led growth hypothesis debate is to establish whether outward oriented trade strategy or inward strategy really serves a country better. But, based on the neoclassical view, growth can be achieved through export promotion. And the case of the newly industrializing countries (NICs) can be easily given as an example. These NICs have doubled their standard of living every decade in the last three decades. China is another country who has joined the league of NICs. As Findlay and Watson (1996) rightly put the Chinese experience during 1980s tends to support the argument that openness due to trade is an important avenue through which countries can achieve rapid and efficient growth and better distribution of domestic resources. This assertion of trade aiding growth can also be said for other countries based on several studies that have been carried out including Krueger (1995) which identifies trade

policy as an important and crucial element of economic policy. Given this, the World Bank (1993) takes the experiences of these countries as a 'model' for development.

Though, there has been a lot of enthusiasm and support for export led growth hypothesis and that of trade-growth nexus, this support cannot be said to be universal as there are some critics of this hypothesis that have been antagonizing the features of export-led-growth hypothesis. Buffie (1992) believes that the experiences in the South east and East Asian countries are unique in several ways and not necessarily that these experiences could be repeated in other countries. Other researchers like Jaffee (1985) argue that the reliance on exports to lead the economy to sustainable long-term economic growth, especially in developing countries could not necessarily be the case due to volatility and unpredictability in the world market. Adelman (1984) questions whether trade barriers will hinder the route of development or if the market in advanced countries are enough for much exports from the developing world. Thus, there are scholars that agreed with the counter development strategy of import substitution or protectionism (e.g. Prebisch, 1950; Singer, 1950). This strategy includes the use of different policy instrument, such as quotas, subsidies and tariffs, to replace the domestic output for imports; the implementation of inward-oriented strategy occurs without effects from other economies and it could be used to raise output and employment immediately. This kind of policy of the government can be used to facilitate domestic firms instead of foreign ones. Hamilton and Thompson (1994) opine that the experience of Latin American countries have shown that trade between the North and South has been yielding negative impact on some Latin American countries, which then translates to high expenditure for the government on incentive schemes, domestic industry setbacks, agriculture, trade imbalance as well as ecological damage. Eswaran and Kotwal (1993) further argue that part of these effects may be due to the nature and kind of good that is being traded.

The promotion of import substitution development strategies could help in the development of a variety of industries that would promote rapid industrial development, while export promotion might just result in the

selection of a number of industries. This may lead to a situation where the country is held back producing goods from which the economic benefits have been exhausted. Some scholars, especially Corden (1987), argue that there might be a rise in taxes in a hidden fashion, if government uses tariffs, quotas, etc in financing the level of development. Grossman and Helpman (1991) argue that the explicit use of tariffs may benefit countries with a comparative disadvantage in the key sectors e.g. Research and Development, which might lead to growth. Based on empirical findings, it is shown that many countries promote exports in one or more sectors, while protecting others. Thus, the combination of export promotion and import substitution strategies may well be complementary, while the latter may be a necessary step for export-led growth (e.g., Hamilton and Thompson, 1944; Ogunkola, 2005).

Another direction to this argument in the literature is the potential of growth-led export (GLE). Growth-led export is likely unless antitrade bias results from the growth-induced supply and demand (Bhagwati, 1988). The Neoclassical trade theory supports this notion, as it posits that there are other factors apart from exports that are responsible for output growth; for example, factor productivity growth. Lancaster (1980); Krugman (1984); Jung and Marshall (1985); Ahmed and Kwan (1991); Bhasin (1999); Herzer, et al (2004), etc., justify the GLE and argue that economic growth leads to improvement in skills acquisition and technology, which translate to a rise in the level of efficiency that would facilitate a comparative advantage for the country that facilitates exports. Moreover, government intervention in the economy due to market failure might lead to GLE.

Feedback causality also exists between export and income growth. Helpman and Krugman (1985) assert that exports may be due to the realization of economies of scale as a result of productivity gains; which might enable reduction in cost that will ultimately translates into further output gains. An increased trade produces more income that also leads to more trade, and so on (Bhagwati, 1988).

However, irrespective of the aforementioned arguments, Pact (1988) argue that there are still possibilities for absence of causality between exports

and economic growth when the growth paths of the two time series are determined by other, unrelated variables in the economic system.

V. Theoretical Framework

The export-led growth hypothesis postulates that exports are essential ingredient for the enhancement and acceleration of long run economic growth. Theoretically, a lot of argument had been put forward to justify the export-led growth hypothesis. There are two perspectives to this hypothesis: the demand and supply side. The demand-side perspective argued that demand growth sustainability cannot be maintained in a domestic market that is small, given the fact that economic impulse based on the expansion of domestic demand is bound to be exhausted quickly. In contrast, export market can not be exhausted and do not involve growth restriction on the demand side. Agosin (1999) opined that as a component of growth, exports could be a catalyst of output growth.

Further, from the supply-side of export-led growth hypothesis, the expansion of exports could promote and enhance economic growth through a rise in the total factor productivity (TFP). This begins with the fact that an expansion in exports might enhance and encourage specialization in sectors that have comparative advantage in the country and it will lead to reallocation of resources from a relatively inefficient non-trade sector to the more productive export sector (Silivestors and Herzer, 2005). Also, Helpman and Krugman (1985) opined that the growth of exports can increase productivity by offering larger economies of scale. In addition, export growth might affect total factor productivity through dynamic spillover effects on the rest of the economy (Feder, 1983). The sources of these knowledge externalities include productivity growth through increased competitiveness, more efficient management styles, better forms of organization, labour training, and knowledge about technology and international markets (Chuang, 1998). This knowledge is acquired through a systematic learning mechanism initiated by exports and spilling over to the domestic economy. Lastly, Riezman, et al. (1996) believed that export expansion might indirectly affect growth by providing the foreign exchange that allows for increasing levels of capital goods imports. Then, by increasing

the importation of capital goods would stimulate output growth by raising the level of capital formation. Thus, the importation of capital goods from technologically advanced countries might lead to a rise in the productivity, which could translate to economic growth, given the fact that knowledge and technology are embodied in equipment and machinery that are transferred through international trade (Chuang, 1998).

Further, base on this ELGH efforts have been made in the literature to disaggregate the exports so as to show the impact of these categories of exports on economic growth. Lucas (1993) opined that the dynamic effects of spillover of the technology are associated with manufacturing exports rather than primary exports. However, many scholars (e.g. Dawe, 1996) have hypothesize that both primary and mining exports could serve as hindrances to greater productivity growth. They based their argument on the fact that (i) primary goods give no sustainable potential for the spillover of knowledge, and thus a rise in export of primary goods could move resources from the externality generating manufacturing sector (Sachs and Warner, 1995). (ii) Also, that extreme price and volume fluctuations affect primary exports. Thus, there might be a rise in GDP volatility and uncertain in the macro economy due to a rise in the primary exports. According to Dawe (1996) this volatility and certainty might also hinder efforts at planning the economy and bring down the efficient and that of quantity of investment.

Another theoretical basis for the study is that of Heckscher-Ohlin (1933) theory, which was developed by Heckscher-Ohlin (1933). This theory tends to relax and modify some of the assumption of the classical theory in order to provide a realistic and better reason for the existence of differences in the comparative costs between countries. This theory was built around two basic features of countries and goods. That countries differ from each other based on the factors of production they possess, and also that goods differ from each other based on the factors that are required in their production. Given this as it may, they posited that a country would be able to produce at a lower cost (and this posses comparative advantage in) those goods whose production requires relatively large amounts of the factors of production (this is also known as factor endowment, e.g., labour, land, capital, natural resources) with which the country is relatively

endowed. This theory of trade is also known as modern theory of external trade or better still neoclassical theory of external trade. This theory differs from that of Classical theory in the sense that it introduces capita as a second factor of production and then relaxes the assumption that each economy has a fixed input/output technology. But, assume that technology sets available to each country are identical and that tastes in the two countries are identical .Trade in this theory is as a result of the differences in comparative cost, which is due to inter-country differences in relative factor endowment (Okoh, 2004). Agiebenebo (1995) argued that this theory leads to free trade internationally and it will enable domestic economy to maximize national and global production efficiency, output, consumption and welfare. But, concluded that the policy inference of the neoclassical and that of classical theories are exactly the same.

The theory of Vent-for-surplus was developed by Adam Smith (1937) to extending domestic markets. This theory assumed positive correlation between foreign trade and economic growth. According to Irwin (1996) this theory was made known due to the success of the Asian newly industrializing countries in the 1980s and 1990s. According to this theory there are opportunities to put to adequate use formally underemployed land and labour resources to produce greater output for export to foreign market rather than reallocating fully used resources as it is in the traditional theory. Also, the idle resources would be adequately utilized with liberalization of trade and it will increase the production of primary products for exports thereby moving the domestic economy towards its production possibility frontier. Todaro (1977) and Iyoha (1995) agreed that this theory provide a better realistic analytical framework of the past trading experience of developing countries than that of classical and neoclassical theories. Thus, this theory tends to show that if a country is producing within or inside its production possibility frontier, this means that there is underutilization of resources, which will propel the country to rent or mobilize these resources for export purposes and thereby moving toward and along the production possibility frontier.

VI. The Model

On the basis of the above theoretical background, the empirical model of the study will start with a Cobb-Douglas neo-classical production function, given the fact that Krugman and Obstfeld (2000) agreed that neoclassical model is a better model to work with than the classical and specific factor models. Since it conveys a deeper understanding of how resources may drive trade patterns. Therefore, we adopt Herzer, *et al* (2004) neoclassical Cobb-Douglas production function with some modifications, in terms of inclusion of some vital variables;

$$Y_t = A_t K_t^{\alpha} l_t^{\beta} \quad (1)$$

Where Y_t denotes the aggregate output of the economy at time *t, (GDP), and* $A_{t,}$ K_t, L_t are the levels of total factor productivity, the capital stock, and the stock of labour, respectively. Given the fact that we want to know if exports affect economic growth through increasing productivity, then we assume that total factor productivity (TFP) could be expressed as a function of oil and non exports, capital goods import, investment, education and energy consumption. The rationale for inclusion of these variables is to prevent spurious conclusions regarding ELG hypothesis and to endogenize growth equation. According to Shan and Sun (1998) any study that does not consider the endogenous nature of the growth process, to a large extent, are liable to simultaneity bias and would give unreliable conclusions. Therefore, TFP is expressed as:

$$A_t = f\left(OX_t, NOX_{t,} CM_t, INV_t, EC_t\right) \quad (2)$$
$$= OX_t^a NOX_t^b CM_t^c INV_t^d EC_t^f$$

Where

OX = Growth rate of Oil Exports
NOX = Growth rate of non oil exports
CM = Growth rate of Imports of Capital goods
INV = Growth rate of Investment
EC = Growth rate of Energy Consumption

Combining equation (1) and (2) to obtain

$$Y = K_t^{\alpha} L_t^{\beta} OX_t^{a} NOX_t^{b} CM_t^{c} INV_t^{d} EC_t^{f} \quad (3)$$

where : α, β, a, b, c, d, e, f, and i are the elasticities of production with respect to K_t, L_t, OX_t, NOX_t, CM_t, INV_t, ED_t, *and* EC_t, respectively. Thus, taking the natural logs (In) of both sides of equation (3) gives the estimable linear production form:

$$InY_t = V_o + \alpha InK_t + \beta InL_t + aInOX_t + bInNOX + cInCM_t + dInINV_t + eInEC_t + 1_t \ldots\ldots\ldots(4)$$

Where V_o is the constant and λ_t is the stochastic or disturbance terms, which stands for, among others, the influence of other exogenous variables that are not considered in the model. Thus, the estimates of *a, b, c*, d, and e are the coefficients and at the same time elasticities of the five selected exports variables, they also serve to measure the productivity effects of these exports on economic growth.

A-priori Expectations

Theoretically, in growth equation (4), we expect each of the explanatory variables to have a direct effect on the real GDP, that is, the coefficients $\propto, \beta, a, b, c, d, e, > 0$.

VII. Estimation Technique

Prior to testing for the direction of causality between the time series, the first step is to check the stationarity of the variables used in the models. The purpose of this test is to establish whether the time series have a stationary trend, and, if non-stationary, to determine the order of integration. The Augmented Dickey Fuller (ADF) unit root test shall be use to test the stationarity of each of the time series that will be used in this study. After testing for the stationarity or otherwise of the time series we finds that they are I(1) variables, the next step is to test whether these time series can be co-opted to give meaningful results through a cointegration test. This study shall use the Johansen cointegration test developed by Johansen (1995) rather than that of Engle-Granger (1987). The reason for this is that, Engle-Granger usually estimates the cointegration equation and tests the residuals for stationarity, which have the tendency to be biased. Apart from that it assumes one cointegrating vector in the systems

with more than two variables and lastly it assumes arbitrary normalization of the cointegrating vector. Given these shortcoming we specify the full information maximum likelihood (FIML) cointegration approach developed by Johansen (1995).

After examining the time series properties of these data, the next step is to estimate the growth equation. In this study, we shall be using the least square estimation. Granger Causality test shall be used to test for causality in the model. This study makes use of annual time series from 1960 – 2005. And they shall be sourced from Central Bank of Nigeria (CBN) publications, National Bureau of Statistics (NBOS), World Development Indicator (WDI).

VIII. Empirical Findings

We present different results in this section in order to make adequate comparison among them. The results of ordinary least square (OLS) at level and the natural logarithm, stationarity and cointegration tests, impulse response and that of granger causality test are given here.

The Regression Results

We presented two types of regression results, with and without natural logarithms.

Table 2: Regression Result

Variable	Regression with log	Without log
Constant	3.6007 (8.63)	134197.1 (1.26)
OX	0.5153 (9.08)	1.2405 (33.08)
NOX	0.1353 (1.80)	11.6173 (2.90)
CM	0.1111 (1.33)	-1.6011 (-4.43)
EC	0.0114 (0.16)	5795.134 (1.66)
INV	-0.0019 (-0.09)	-789.0929 (-3.77)
L	-1.6889 (-3.36)	-52697.67 (-1.27)
K	0.2320 (1.95)	2.5679 (19.97)
R^2	0.98	0.98
S.Error	0.0611	2289.35
F-Statistics	2078.056	5776.472
D.Watson	2.1975	2.1413

The t-values are in parentheses
Source: Author's computation

The result with logarithms shows that there is a significant positive relationship between oil exports and economic growth. What this means is that as more and more foreign earnings is derived form the oil exports there will be more income available to the government to provide infrastructure and other enabling environment to enhance productivity, which in turn accelerate the level of economic growth. The coefficient which is 0.5153 indicates that the degree of responsiveness of GDP to change in oil exports is elastic, that is, for every 1% increase in oil exports earnings, there will be over 51% increase in the GDP. The same result is gotten for non-oil exports, which also shows that there is a direct relationship between non-oil exports and GDP growth rate, though it is not significant. This means that though non-oil exports have positively impact on GDP, but they are insignificant. And for every 1% increase in the foreign exchange earnings from non-oil exports, there will be over 13% increase in the level of GDP.

There is positive relationship between importation of capital goods and the GDP in Nigeria. This relationship though statistically insignificant, depicts that the degree of responsiveness of GDP to change in importation of capital goods is elastic. Energy consumption as measured by energy used in the country shows that it is positively and insignificantly related to GDP. This means that as more and more energy is consumed, there will be increase in economic activities and this enhances productivity that would accelerate the level of economic growth. However, this is not so because the country's energy consumption is inadequate such that its contribution to the GDP can be overlooked.

Investment growth rate is inversely related to the level of economic growth in Nigeria. What this means is that as the level of investment increases, there will be reduction in GDP. The reason one will give to this is that the kind of investment that is being put in place is not a genuine one, that is, it is not productive, self sustaining and people's friendly. That is, investment in the real sector of the economy is not embarked upon while businesses in the non-productive sectors e.g. loans for the importation of consumer goods are striving.

Labour force also has a significant negative relationship with GDP. This means that the labour force is not productive because of the poor educational system, workers more than the available jobs, which lead to diminishing marginal productivity etc. in the country. The coefficient of capital indicates that it has a direct relationship with the GDP. Meaning that as more and more capital is acquired in the economy; this will accelerate productivity level and thereby increase the level of economic growth. The coefficient of determination, R^2, shows that 98% of the changes that may occur in the GDP will be caused by the explanatory variables selected in this study. The standard error of the study is low, meaning that the estimates have goodness of fit, while the f-statistics show that the model is statistically significant to the study. And the measure of serial correlation (Durbin Watson) shows that there is little or no serial correlation in the model.

The result of the regression without natural logarithms is slightly different from the one with natural logarithm as capital goods importation is now negatively related to economic growth and it is statistically significant. Variables like non-oil exports, investment and capital are not statistically significant.

Table 3: ADF Test

Variable	Level	First Difference	Order of Integration
GDP	0.4715	-4.1555	I(1)
LOX	-0.9578	-7.1207	I(1)
LNOX	0.4509	-5.9071	I(1)
LCM	-0.8101	-7.1423	I(1)
LEC	-4.4433	-	I(0)
LINV	-3.7181	-	I(0)
LL	-2.0850	-4.4597	I(1)
LK	0.0653	-3.5714	I(1)

Note: *the 5% critical value for the ADF statistics is approximately -3.6394 for levels and -2.9540 for first differences. These critical values are computed from Mckinnon (1996)*

Table 3 above shows the stationarity test result and it indicates that oil exports, non-oil exports, capital goods importation as well as labour are stationary at their first difference, meaning that they are integrated of order one, i.e., I(1) variables. However, energy consumption and investment are stationary at their level, meaning there are I(0) variable.

Given that some of these variables are integrated of order one, while others are integrated of order zero, it is then necessary to know whether these variables could be used together in the model to get a reliable result. This we can do through the cointegration test. The result of the cointegration test could be seen in table 4 below. From the table, it is shown that the variables are cointegrated, given that the trace and maximum Eigen statistics are greater that the 5% level of significance in two different times, which means that there are two cointegrating equations or vectors in the model. Thus, this result established long run relationship in the model.

Table 4: Cointegration

Ho:	H_1	Trace Statistics	5% Critical Value	Max-Eigen Statistics	5% Critical Value
r= 0	r=1	185.7660*	124.24	66.4236*	45.28
r≤ 1	r=2	199.3424*	94.15	51.7856*	39.37
r≤ 2	r=3	67.5568	68.52	30.5522	33.46
r≤ 3	r=4	37.0045	47.21	18.6695	27.07
r≤ 4	r=5	18.3351	29.68	13.1489	20.97
r≤ 5	r=6	5.1861	15.41	4.7339	14.07
r≤ 6	r=7	0.4522	3.76	0.4522	3.76

** denotes rejection of Ho at the 5% level*
Source: Author's computation

Table 5: Impulse Response (GDP)

Variables	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
LOX	0.12	0.29	0.07	0.01	0.09	0.02	-0.07	-0.01	0.01	-0.01
LNOX	-0.03	-0.06	-0.03	0.02	-0.01	-0.05	-0.06	-0.02	0.02	0.05
LCM	-0.02	0.01	0.06	0.22	0.16	-0.01	-0.05	-0.03	-0.03	-0.01
LEC	-0.31	-0.03	-0.01	-0.07	0.01	-0.07	-0.13	-0.04	0.01	-0.01
LLA	-0.01	0.02	0.01	-0.01	0.01	0.01	-0.01	-0.01	-0.01	-0.01
LK	0.02	-0.06	0.06	0.15	0.03	-0.05	-0.03	-0.04	-0.04	0.01

Source: Author's computation

Table 5 above shows the impulse response result, which shows what will happen to the dependent variable (GDP) if there are shocks to the explanatory variables. The response of the GDP in ten different periods if there are shocks in the explanatory variables. Any shock in the oil-exports will lead to 12% change in the GDP in the first period, by the second period, it has gotten to 29% and in the tenth period, there had been negative response of GDP to oil export shock. Non-oil exports shock will have negative impact on GDP in most of the periods. Same result applies to all other explanatory variables in the model, that is. Any shock in them affects GDP negative.

Table 6: Granger Causality Test

Null Hypothesis	F-statistic	Prob.	Decision
LOX does not Granger cause LGDP	3.5126	0.0045	Reject
LGDP does not Granger cause LOX	6.8201	0.0039	Reject
LNOX does not Granger cause LGDP	0.1450	0.8656	Accept
LGDP does not Granger cause LNOX	4.8293	0.0041	Reject
LCM does not Granger cause LGDP	0.6289	0.5406	Accept
LGDP does not Granger cause LCM	4.4053	0.0217	Reject
LEC does not Granger cause LGDP	1.0232	0.3769	Accept
LGDP does not Granger cause LEC	1.2757	0.3000	Accept
LLA does not Granger cause LGDP	0.0229	0.9774	Accept
LGDP does not Granger cause LLA	0.7608	0.4774	Accept
LK does not Granger cause LGDP	1.6850	0.2044	Accept
LGDP does not Granger cause LK	4.9187	0.0151	Reject

Source: Author's computation

Finally, the result of the granger causality test shows that the direction of causality between oil export and GDP has bilateral or feed back effect causality. This means that as GDP causes changes in oil exports so also oil exports cause changes in GDP. However, for the direction of causality between non-oil exports and GDP, the result in table 6 shows that they have unidirectional causality form GDP to non-oil exports. This means that GDP causes change in non-oil exports but non-oil exports did not cause any change in GDP. For the causality between capital goods importation and GDP, we found that there is unidirectional causality between them from GDP to capital goods importation. That is, GDP causes change in capital goods importations while capital goods importation does not cause any change in GDP. However, for the direction of causality between energy consumption and GDP, and that of GDP with labour, the result shows that there are indifferent causalities. While the GDP causes change in the capital without capital causing any change in GDP.

IX. Conclusion and Policy Implications

This study intends to investigate the export-led growth hypothesis for Nigeria between the periods of 1970-2005. This is an update to the previous empirical studies that have been done in this area in Nigeria, especially that of Ekpo and Egwaikhide (1994). We have been able to show that pattern and structure of exports performance in Nigeria over the years. And we have seen from the literature that there are divergence opinions as to the direction of causality in the export-led growth hypothesis.

The ordinary least square (OLS) estimation technique has been used in this study, while the Augmented Dickey Fuller (ADF) stationarity test has been used to test the time series properties of the data. We have used the impulse response technique to show the effect of shocks in the explanatory variables on economic growth as measured by GDP. Furthermore, the Johansen cointegration test has been used to establish long run relationship in the model, while granger causality test has been used to test the export-led growth hypothesis.

We discovered from the study that all the variables used are I(0) variables except energy consumption and investment that are I(0) variables. The outcome of the cointegration test shows that there is long run relationship in the model and this result can be used for forecasting without loss of information in the long run. Thus, we found out from the causality test that there is feedback causality between oil export and GDP, while that of GDP and non-oil exports is unidirectional from GDP to non-oil exports. The impulse response result shows that except for oil exports shock that will have mostly positively impact on GDP; other explanatory variables will have indirect effect on GDP in most of the period. These results attested to the fact that both exports and GDP growth are important aspect of economic growth and development in Nigeria. Suggesting that the export promotion industrialization strategy of the government should be intensified since it has the potential and ability to translate into positive multiplier in the economy.

The emanating issues from the empirical results are that both oil and non-oil exports contributed to the enhanced economic growth that the country experience, however, the contributions of oil export is very relevant and significant to Nigeria's economic growth. Also, the GDP responded faster to increase in the foreign exchange earnings from oil export than that of the non-oil exports. The increase in capital goods import (which are used as inputs) have the potential of enhancing economic growth if the productive base of the economy is stimulated through provision of the necessary enabling environment for productive to strive. Furthermore, the energy consumption level in the country is inadequate such that it is insignificant to growth and investments are not channel to the productive sector(s) of the Nigerian economy.

Thus, outward oriented industrialization strategy of the government should be pursued more rigorously through the export promotion policy measures that would encourage the provision of enabling environment like adequate infrastructural facilities, reduction in trade and non trade barrier to investors so that it will motivate them to produce for exports, which will lead to sustainable growth and development in the country.

Therefore, an important implication of these findings for the Nigerian government and policymakers is that all efforts must be put in place to ensure that the country achieve high sustainable economic growth. This will lead to increased exports given the feedback or bidirectional causality that would further translate into high economic growth, and the cycle continues. Thus, government should embark on developmental policy that would encourage both export expansion and the enhancement of economic growth.

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The Economic Aftermath of the 1960s Riots: Evidence from Property Values* – A Review

Magnus O. Abeng*

I. Introduction

The current spate of riots the world over has assumed a worrisome proportion to managers of economies. In the United States of America (USA), for instance, during the 1960s, numerous cities experienced violent, race-related civil disturbances. Nigeria in the recent past, had recorded some of history's most violent religious and ethnic related crises. Although social scientists have long studied the causes of these riots, the consequences have received much less attention. The paper focused on the impact of riots on the value of residential property with an emphasis on black-owned property in the US using census data. The focus was informed by the fact that property value is one of the indicators of neighbourhood quality and secondly the widening gap in housing values which may not be unconnected with the occurrence of riots.

II. Synopsis of the Paper

In examining the causes of riots in the United States, the authors identified discriminatory norms and public policies, large capital gaps in income and wealth, relatively low demand for unskilled labour due largely to macroeconomic and technological developments, rural–urban migration, rising rates of crimes and unemployment as some of the predominant causative factors.

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Using city-level and household-level data, the paper found persistent negative and economically significant correlations between riots severity and black-owned property values. The paper attempted to capture the omitted variables that could misstate riots' true impact on property values by controlling series of city characteristics such as pre-existing trend in housing values, pre-riot city size, black population size, manufacturing, employment, residential segregation, crime and region. The authors adopted the instrumental variable approach to estimating the riot effect and observed that riots have strong negative impact on property values.

The paper further took a cursory look at the historical chronology of violent race-related civil disturbances in the US from the early 18th century eliciting the causes, character, magnitude, geographical spread, duration, location, targets, associated number of arrests, injuries, occurrence of arson, and deaths recorded. The severity of the riots were measured in absolute terms using five characteristics (deaths, injuries, arrests, arson and number of days of rioting) on a cumulative basis to form an index.

In assessing the potential influence of riots on the affected areas, the authors found that riots could either lead to:

- large inflow of outside resources thereby improving the economic quality of life of the residents and businesses
- generate no significant alteration in economic decision since they are temporary
- set in motion a dynamic process of deteriorating economic outcomes as mobile residents and businesses relocate to more secure environs and
- depreciation of public goods and amenities as they are vandalized and abandoned.

Another instructive adverse impact of riots is the shift in perceptions regarding future costs and benefits associated with residing in, doing business in, or even traveling through a particular city. The paper argued that since property values cannot be isolated from the streams of net benefits of riots, riots therefore, impact negatively on and lead to decline

in property values particularly in central cities. Higher personal and property risk, rising insurance premiums, increased police and fire protection, closure of retail outlets, relocation of businesses and employment opportunities, relocation of friend and families and burned out buildings were some identified effects and costs that may potentially depress property values. All these have implications on property values especially as demand stock adjusts slowly to negative shocks.

Using census data that reported an array of relevant city-level information the authors found out that the median property values for samples of all owner-occupied housing fell in the medium- and high-severity cities relative to low-severity cities. They further found out that a negative demand shift in riot areas could be accompanied by a positive demand shift in non-riot areas within the same city. The analysis showed that property values in riot–torn cities do not bounce back relative to others. The instrumental variable approach in which rainfall (there is considerable anecdotal evidence that people are less likely to engage in collective violence when it rains) and city administration (that isolates plausibly exogenous variation in riot severity) were used to measure the riot effect. The 2SLS estimate was also applied in testing the above instrumental variables. In the base specifications, the paper regressed the severity-group on region dummies, city size, black proportion of population in 1960, rainfall in April and city-manager dummy. The 2SLS coefficients were uniformly negative, economically large, and remain near conventional levels of statistical significance. Thus, from every empirical point of view (simple summary statistics, OLS estimates, and 2SLS estimates), riots were associated with relative declines in central-city property values, especially for black-owned property.

The authors used household-level data as well as city-level data with a view to comparing black with white housing values. The household-level data was adopted to examine the relationship between riot severity and metropolitan area property values in 1970 and 1980 as well as examine the changes in the racial gap in property values. The econometric analysis revealed that while black-owned property values in riot-afflicted cities did not rebound in the 1970s, it however, declined in high-severity riot areas.

The authors concluded the paper by stating categorically that the occurrence of a riot significantly depressed the value of black-owned property and that riots appear to have strong negative effects on black property values. The results also suggested that the racial gap in housing values widened in riot-afflicted cities. The riots were adverse shocks with long-lasting and potentially self-propagating effects while riot-torn tracts lost substantial amounts of population relative to non-riot tracts, which is consistent with a decline in the demand for housing in response to a decline in perceived neighborhood quality.

III. Comments

The authors' appraisal of the social and economic impact of riots on an economy deserves commendation. Their comprehensive and in-depth analysis on an issue that has currently assumed national and global concern is quite enlightening and recommended for countries like Nigeria where the spate of the social phenomenon of riots had assumed a worrisome dimension. The paper is written in plain diction while the authors' use of simple and non-technical language makes it reader friendly.

In terms of summations reached by the authors, I quite agree with some of the several conclusions. For instance, the fall in property value as found by the authors quite mirrors the Nigerian scenario. Property values often record drastic decline in regions plagued by riots as relocating persons flood the property markets with their holdings in a bid to avert complete loss. The authors' allusion that riots in one region would attract large inflow of resources to the region affected, was to say the least, the truth but the conclusion that it would result in improving the economic quality of life of the residents and businesses cannot be generalized. Nigeria has had an unprecedented record of riots, yet the areas affected had witnessed remarkable decline in development as most of the relief material donated from both internal and external donors hardly to get the riot-affected persons, hence, the affected people remain worse off rather than benefiting from the expected resource flow from donors. The same could be said of investors' interest in such riot-prone areas. Regions of high rate of violent riots, irrespective of the motive, had of late recorded significant decline

in internal and external capital or investment inflow. Existing companies are pulling out while little new investment is recorded in those areas. These had not only impoverished the people but drastically constrained government revenue streams from such investments.

IV. Usefulness of the Review on Policy to Nigeria

The topic is of immense importance to Nigeria especially as both the US and Nigeria have a historical tract record of violent riots even though the causes are often attributed to different factors. The spate of these ethnic-related riots that had occurred since the inception of democratic governance is worrisome; unfortunately no comprehensive research on the impact of the riots on the Nigerian economy has been undertaken. The importance of the paper is underscored by the fact that riots, along with other social and economic vices, undermine development, retard growth, decelerate investment as well as erode confidence in the economy thereby reducing external support required for economic growth and development. Riots inflict an unquantifiable damage on the image and resources of the country while an incalculable physical damage and inventory loss are suffered by businesses. Tourism development, a vital industry, is hampered while the human toll of riots is immeasurable – physical suffering, psychological toll, loss of sense of security, etc. The rise in violent crimes as well as the over-tasking of law enforcement agencies leave much to be desired. Currently Nigeria is seen as a cauldron of violence with widespread implications. While some of these consequences are obvious and immediate, others manifest long after the riot. But until this unprecedented wave of riots is curbed, Nigeria would continue to pay a steep economic and social price for the riots that have torn the nation apart.

V. Conclusion

The several conclusions reached by the paper are imperative and elucidated some crucial and fundamental lessons which Nigeria must consider if the nation is to return to the path of sustainable development. The spate of riots in the country is a pointer to suppressed grievances (particularly during the era of military regimes) which the government must critically

examine since development and growth do not take place in a vacuum but in a society. Not only does investment need protection but the lives and property of investors, especially foreigners must be secured. While it is not an offence for a peaceful protest, legal infrastructures must be put in place to appropriately sanction those who seize such opportunities to vandalize public or private properties.

Setting the Operational Framework for Producing Inflation Forecasts[+]

Phebian N. Omanukwue*

I. Introduction

The paper reviewed discusses the intricacies and processes involved in the production of the "best possible inflation forecasts". Issues such as the choice of an appropriate index, the forecast design and requirements as well as communication strategies were discussed therein. The significance of the paper lies in the fact that it serves as an operational guide to countries transiting to inflation targeting. A summary of the paper is presented below, followed by lessons for Nigeria.

II. Summary of the Paper

In the study, inflation targeting was defined as a framework which involved the designing and implementation of monetary policy around a long-term inflation objective. The importance of inflation targeting as a monetary policy framework for reducing the lags associated with monetary policy actions, and which could boost the credibility of the monetary authorities in the performance of its mandate was clearly underscored in the paper. The paper also highlighted that an important element of inflation targeting central banks is the production and announcement of an explicit inflation target. The study highlighted the importance of choosing an appropriate price index as a measure of inflation target. Such an index must be provided on a timely basis, not prone to constant revisions and is easily understood by the public. As noted in the paper, most inflation targeting economies

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use the consumer price index. Understanding the time series properties of the index and separating the transitory components of the chosen price index from its permanent components were also highlighted. In the case of computing the core inflation, the authors identified three basic methodologies. The first being the traditional approach of excluding the items prone to transitory shocks such as food and energy prices from the price index. The second approach examined the distribution of price movements in the CPI components and excluded any extremes, while the third method adopted the time series technique to estimate the trend component of the index. According to the authors, either of these methods could be used depending on the objective or purpose. For instance, the traditional approach is considered appropriate for communication purposes, while the last two are considered more useful for forecasting exercises.

Some factors that central banks needed to take account of when producing inflation forecasts were identified. In preparing such forecasts, the authors noted that it was important for central banks to consider the interest rate path either by making no explicit assumption (unconditional forecasts) or identifying explicit interest rate path (conditional forecasts). Basic types of explicit interest rate paths identified were (i) a constant interest rate path, which determines future interest rate path in the absence of any policy changes by the central bank, (ii) determination of inflation forecasts based on market forecasts of interest rates, (iii) central banks, through its monetary policy committees can decide on the future path of the policy interest rate on a discretionary basis (iv) determine interest rate path based on the policy reaction function of the Central Bank to shocks in the economy. It was noted that the fourth option was the "best, most consistent and technically sound for developing a professional inflation forecasts". It was however stated that central banks may not need to disclose the policy interest rate path to the public, (as is the case in practice of most central banks) in order to avoid a possible loss of credibility when there were deviations from projected interest rate.

Other factors considered include, the forecast design and organization, which involved identifying and assigning tasks to the forecasting team according to their competencies, determining if the forecasts would be

point or range estimates. The third factor was data management. This entailed gathering of data/information as relevant for the forecasting process, minimizing errors and gaps in the data, storing the database, regular update of the database as revisions are received and documentation of the forecasting exercise. The fourth factor identified was that inflation forecasts must be consistent with other policy decisions of the Central Bank. The forecast estimates must be provided in a short term (quarterly) and medium term frequency (yearly/policy horizon). The short term forecasts reviews the current state of the economy and provides quarter-ahead forecasts relying on expert judgment, time series analysis, survey evidences on macroeconomic conditions and expectations on future economic activity. On the other hand, the medium term forecasts involved expert judgment about the future path of economy based on assumptions of endogenous and exogenous variables, the central bank's view of the transmission mechanism and the development of structural models that would examine the impact of policies such as interest rates on the medium term inflation. It was stated that the forecasts would, of necessity, depend on an identified transmission mechanism, which could be adaptive or forward looking in nature. In deciding which of the forecast estimates to use, the authors stated that the medium term forecast that relied on core macroeconometric models were useful in the decision making process and becomes the basis on which information is exchanged. This was not meant to connote that short term forecasts were irrelevant, but rather they complement the results from the medium term forecasts.

As measures to boost public confidence in the inflation forecasts, it was recommended that central banks should involve the private sector and reputable international experts in the production of alternative forecasts for comparison purposes. Such forecasts could be centralized on an electronic bill board which would also afford central banks the opportunity of assessing new developments in forecasting techniques. According to the authors, independent reviewers could also be called upon at varying times to review the monetary policy framework and forecasting methodologies adopted by the bank as is the practice with Bank of England, Reserve Bank of New Zealand, and Norges Bank. Another measure could be through organizing forums at intervals which would provide the

opportunity to educate and increase the awareness of the private sector of the uncertainty associated with the production of inflation forecasts as well as generate discussions on modern inflation forecasting techniques. The authors, however, noted that the risks of the private sector involvement could mean using privileged information for their own profit purposes, which may reduce the credibility of the central bank. Thus, the central bank's involvement of the private sector would require careful choice and timing of various strategies.

The authors also identified the need for central banks to develop and institutionalize a framework for the decision making process as well as communicating policy changes or otherwise to the public in a transparent manner. Such a framework could be in the form of holding regular meetings (annual or quarterly) where the forecasting team presents forecasts to the monetary policy committee or technical committee, as the case may be. According to the authors, such presentations provide the forum for discussions on various scenarios/assumptions, risks and uncertainties in the forecast, future inflation path, policy variables consistent with the central banks' objective and eventual communication of forecasts through any means as agreed upon by the central bank. Furthermore, the authors noted the need for appropriate timing, designing a communication strategy (In most central banks, this is done through the publication of an inflation report) and deciding on the content of any published inflation report. These critical issues when properly implemented would serve to improve the credibility of the central banks, the forecast quality and provide a better understanding of the actions of the monetary authorities. Overall, the authors reiterated the need to have a flexible forecasting framework that takes into account the evolution of the structure of an economy, new theories and data management techniques.

III. Comments and Lessons for Nigeria

The paper is quite apt and timely, especially for economies transiting to inflation targeting. Indeed, it contains summarized, yet relevant information on the practice of inflation targeting in several economies, which could serve as a reference point for other central banks to further improve or

modify existing structures in place. An important characteristic of this article is the authors' use of unambiguous words in ensuring that readers were not left in the dark as to the issue being discussed. The lessons for Nigeria are discussed in the following paragraphs.

The institution responsible for designing and implementing monetary policy in Nigeria is the Central Bank of Nigeria. A paper of this nature brings to the drawing table, the initial conditions and necessary framework required to operationalize an inflation targeting regime in the event of its adoption. Though, the Nigerian economy has witnessed some developments such as improved fiscal prudence/adherence to the fiscal rule, increased autonomy of the central bank and improved depth of the financial markets that makes a case for adopting inflation targeting, the issues discussed hereunder need to be carefully addressed by the monetary authorities in the event of a transition to inflation targeting.

Inflation forecasting is the pivot in the monetary policy decision making process of an IT central bank for two reasons. First, forecasts serve as indicators of achievable long-run target and deviations from this forecast act as a signal to economic agents. Therefore, the credibility or otherwise of the central bank is hinged on the reliability of its forecasts for future inflation. Adopting inflation targeting as a monetary policy framework has led to the growing importance of the need to understand the dynamics of inflation and the transmission mechanism of monetary policy in an economy in order to forecast its future path.

The need for timely data generation in an IT regime is crucial in the entire framework. Thus, real time data generation, storage as well as dissemination should be intensified. This could be enhanced through an improved design of surveys, questionnaires as well as the provision of relevant tools for the compilation and computing of data. Building and maintenance of the database would include regular updates and revisions of data series, in order to minimize errors and data gaps, stating the sources/time when the data is received and checking the accuracy of data. The impact of all such revisions of the data series as well as their potential impact on the modeling and forecasting exercise must be clearly understood. In some

central banks, such as the Reserve Bank of New Zealand, this led to huge devotion of resources on real time database, which contain data releases for a variety of series. Such a database should be accessible to all members of the modeling and forecasting team as well as the Monetary Policy Committee. It has been proffered in literature that the forecasting team should not be saddled with the added task of data collection and entering data into the database, but should be left to direct its efforts towards producing forecasts, adapting new estimation techniques and improving on its professional ability to make forecasts.

Secondly, in most central banks that have adopted inflation targeting, developing models and generating the forecasts is an inter (intra) departmental effort with clearly defined roles (Table 1). It is imperative for all staff of the Bank, therefore, to understand that irrespective of the fact that there may be an office/department responsible for forecasting, the process of forecasting is all involving. This is very important as the forecasting team may not have access or easily lay hands on policy related and market information that may affect the forecast process. The forecasting team could provide an idea of basic data needed for the forecast process to the relevant offices/department/institutions to assist them in knowing what data to furnish the team with. Following from this, every staff of the Bank should endeavor to pass across revisions of data, without necessarily waiting for a request from the forecasting team as they could affect the forecast estimates. Moreover, time is a crucial element in the entire process that should not be taken for granted, evermore so in an inflation target regime, irrespective of whether it is full-fledged, lite or eclectic in nature.

Table 1: Selected Inflation Targeting Countries: Staff Involved in Forecasting Analysis

IT Economies	People Involved in Forecasting/Their Qualifications	Recent Increase in the Number of Staff Working on Inflation Forecasting	Number of Departments/Divisons Involved in Forecasting/degree of policy makers involvement
Australia	Statement of Monetary Policy preparation involves 40 people.	Yes	Four
Chile	10 people; 1/3 Ph.D.s, 2/3 local Master's degrees	Yes	Two (Conjunctural analysis and Modeling); another department provides international scenario, Monetary Policy Committee
Colombia	10 people, most with Master's degree	Yes	One (Programming and Inflation Forecasting Department); there is also a representative from the Macroeconomic Modeling Department
Czech Republic	7*(Ph.D.s, with an international experience)	No	One (Monetary and Statistics Department, 4 divisions)
Peru	26 people; 14 with Master's degrees, 4 with Ph.D.s.	Yes	One (Economic Studies Department, 8 divisions)
Turkey	18 people; 5 Ph.D.s, 10 Master's degrees, 1 M.B.A., 2 B.A.s	Yes	One (General Directorate of Research and Monetary Policy, 2 divisions)
Ghana	------	-------	2 (Monetary Policy Analysis and Financial Stability Department) including the Monetary Policy Committee.

Source: Canales-Kriljenko et al, 2006, Bank

For inflation targeting to be successful, the central bank has to decide *ab initio* and commit to a de facto mandate of inflation objective. To this extent, all other objectives become subordinated to the inflation objective. Furthermore, given the susceptibility of the Nigerian economy to shocks, implementing an inflation targeting framework, which requires a high level of communication and transparency to the public, may not be such an easy task. To this extent, it is suggested that before inflation targeting is adopted as a monetary policy framework, the public should be sensitized through using existing communication infrastructures, such as radio, television, audiovisuals to the more traditional ones like folklores, traditional dramas in local languages on its basic elements and what any deviation of inflation from its target would mean.

Table 2: Transparency and Communication Issues

	Selected Inflation Targeting Economies				
	UK	Canada	Australia	Ghana	New Zealand
Quantitative Inflation Objective?	Yes	Yes	Yes	Yes	Yes
Reports to Legislature?	Yes	Yes	Yes	No	Yes
Reports on Monetary Policy?		Qtrly	Qtrly	Bi-monthly	Qtrly
Release forecasts?	Qtrly	Qtrly	Qtrly	Bi-monthly	Qtrly
Quantitative Risk Assessment?	Yes	No	No	Yes	No
Press Conferences?	No	No	No	Yes	Yes
Press Releases?	Yes	Yes	Yes	Yes	Yes
Decisions announced Immediately?	Yes	Yes	Yes	Yes	Yes
Minutes of MPC published?	Yes	-	No	No	-

Source: BIS Annual Report (2004), Bank of Ghana, Reserve Bank of New Zealand

Overall, it is imperative to underscore that forecasting inflation is a continuous process that requires careful thinking, expert judgment and analytical skills, not a "one stop assignment" or one that should be done in a hurry. Indeed, forecasting inflation for IT countries requires high frequency and real time data, development and continual upgrade of forecasting models that captures the macroeconomic developments/ transmission mechanism of the economy, bank-wide staff involvement,

existence of a forecasting team that is less inundated with ad-hoc jobs and continuously exposed to recent forecasting methodologies a well as sector experts that bring in to the modeling/forecasting exercise relevant insights. This requires a strong and unflinching commitment from the policy decision making committee in terms of its degree of involvement in the forecasting process, devoting huge resources to technical and institutional capacity building. This entails providing the forecasting team with the adequate tools (technical assistance, hardware and econometric software), regular training of the forecasting team on modern developments in forecasting techniques, econometrics, software programmes, recent developments in macroeconomic theories, computer programming, and data management. Such training is indeed helpful to the extent that the forecasting model would need to be reviewed regularly to take account of modern empirical and econometric techniques. Forecasting is an iterative exercise, which gets better with the accumulation of experience.

Although, Inflation targeting is not a “one size fits all” framework and it may be difficult for any forecasting procedure to capture all the relationships or influences within an IT framework, forecasting remains an essential tool in monetary policymaking. Central bankers and analysts do not have the luxury of ignoring estimates derived from it, as monetary policy making requires more than just the qualitative information that theory provides. There must be some quantitative information, even if the information may at times not be perfect. In the metaphoric words of Alan S. Blinder, former Vice-Chairman of the US Federal Reserve, “You can get your information about the economy from admittedly fallible statistical relationships, or you can ask your uncle”. The choice is yours.

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