EFFECT OF MACROECONOMIC POLICY ON MULTI-SECTORAL OUTPUT PERFORMANCE IN NIGERIA, A TIME SERIES ANALYSIS FROM 1981-2015

Samuel Olayinka Musa
University of Lagos

Abstract
This paper examines the effects of macroeconomic policy on the real sector in the Nigerian economy covering the period 1981-2015. Time series data are employed and estimation technique is based on the auto-regressive distributed lag model (ARDL) which allows dynamic examination of effects of macroeconomic policy on the real sector. Following the CBN and NBS classification, the real sector comprises Agriculture, Industry, Wholesale & Retail, Building & Construction and Services. Policy comprises monetary, fiscal and trade. Respectively, these are represented by monetary policy rate (MPR), government capital expenditure, and exchange rate movement. The findings provide evidence to support the fact that macroeconomic policy is important to address the problem of the real sector in Nigeria. Most importantly, it shows that (MPR) has negative and significant effect on agriculture and industry. Therefore, the monetary authority should adjust MPR to prevent multi-sectoral growth asymmetry. However, the effect of other macroeconomic policy proxy variables on the real sector is ambiguous.

Key Words: Macroeconomic Policy, Monetary Policy Rate, Capital Expenditure,

1. Introduction
There is no doubt that multi-sectoral development is necessary for economic growth and for development to occur. Nonetheless, economic development should, at least, be perceived in terms of advancement towards reducing the incidence of poverty, unemployment, and income inequality. Therefore, simultaneous development of various sectors should serve as an input in the development matrix and is expected to result in raising the standard of living of the citizens in any given economy. Moreover, each sectoral classification should contribute substantially to the national output and create self-sufficiency in essential commodities. In Nigeria the sectors are classified into five major groups which include: Agriculture, Industry, Building & Construction, Wholesale & and Retail, and Services. They are to generate employment, contribute to the growth of the gross domestic product (GDP) and reduce the gap between developing and developed countries.

Several studies have attempted examining macroeconomic effect on individual sectors but few have empirically and simultaneously examined the effect on multi-sectoral performance in Nigeria. For instance, effects of monetary policy rate, government capital expenditure, and exchange rate movement on the real sector are yet to be empirically examined. None of the related studies, (Adenikinju & Olofin, 2000; Adeoye, 2004; Loto, 2005; Fakiyesi, 2005; Adejugbe, 2006; Adewuyi & Bankole, 2007; Adebiyi, 2012) have simultaneously examined monetary policy, fiscal policy and trade policy effects on Nigerian multi-sector. For instance, Fakiyesi and Adebiyi, (2012) specifically focus on

monetary policy; they employ broad money supply and treasury bill rate to capture monetary policy. Theoretically however, owing to uneven distribution of money income prevalent in developing countries and poor financial sector development, these indicators may be ineffective. Alternatively, this study considers minimum re-discount rate or monetary policy rate. Government capital expenditure, order than recurrent expenditure, is considered as proxy for fiscal policy. Additionally, exchange rate movement represents trade policy. Previous authors employ exchange rate policy represented by dummy variables. Exchange rate movement is considered appropriate because it provides information on changes in international market prices of tradeable inputs and output.

A number of development plans and specific policies have addressed the phenomenon of rapid multi-sectoral development in Nigeria. Some of the policies commonly adopted are basically industrial policies to stimulate export or to discourage import. However, most policies in Nigeria are tagged under import substitution industrialization (ISI) or export promotion industrialization (EPI). Historically for instance, Nigeria has adopted and implemented duty draw-backs, tariff adjustment, embargo, interest-free credits or low interest rate credits as well as favourable exchange rate to selected sectors. Yet, statistical facts show that different sectors still contribute sub-optimally to Nigeria's total output, (Ekpo, 2004). If this trend of growth deficiency continues, the twin evil of unemployment and poverty may persist and the goal of Nigeria attaining the Vision 20:2020 becomes a mirage.

Nevertheless, it is interesting to discover that macroeconomic policy has been deployed to address industrial sector in Nigeria at various point in time, but rarely empirically employed in the list of policies to address the Nigerian multi-sectoral performance. It is assumed that sectoral output represents the performance of each sector. The relevant question then is what effects do macroeconomic policies have on Nigeria's multi-sectoral output?

Macroeconomic policies are usually set to meet certain specific objectives which include full employment, price level stability, and economic growth (Tomori, 2005) and (Adebiyi, 2012). They can play a major role in promoting industrialization and economic development. They can be used to affect resources allocation for production and distribution of goods and services. Also, they can be manipulated implicitly or explicitly to influence industrial input or output. They are essential instruments for economic change within the framework of public or private oriented economic activities, (Dornbusch and Fischer, 1981), (Tomori, 1993); (Adewuyi and Bankole, 2007). Moreover, in a nation, macroeconomic policy instruments can play a significant role in transformation from agricultural society to industrial economy. Macroeconomic policy belongs to the domain of normative economics, that is, it involves people making decisions based upon what they think will happen and what will happen depends upon what decisions they make, (Tomori, 2005 and Prescott, 2006). This means the concept of effects of macroeconomic policy on multi-sectoral performance should be dynamically and thoroughly administered.

In a similar path, multi-sectoral development can take the center stage as vehicle for production, employment and income generation. In the development concept, multi-sectoral composition, especially agriculture and industry, are some of the major forces driving the modern economy (Kayode, 1989; Nnanna et al., 2003). Although, macroeconomic policies may target multi-sectoral performance, however, setting goal

particularly to boost performance in each of the sectors is probably more important. This calls for acknowledgement because the real sector seems to be significantly characterized by larger capacity for employment generation and poverty reduction. Moreover, they can also contribute substantially to gross domestic product (GDP), and providing remedy to adverse balance of payments. Typical example can be found in Japanese, Chinese and East Asian Miracles, (Stiglitz, 1996). Evidence reveals that macroeconomic policy is important in multi-sectoral output growth acceleration and can promote increasing industrial and substantial value-added which are critical issues in dynamism of industries and multi-sectoral linkages.

Nevertheless, efficacious macroeconomic policy outcomes depend on domestic environment where it operates. Policy environment tends to directly affect operations of the business sector by shaping the overall business and macro economy environment. The nature and structure of the economic institutions, financial system, tax structure, political and social system can play a major role in determination of environment in which the real sector operates, (Fakiyesi, 2005). Moreover, the choice of tools as well as appropriate macroeconomic policy mix to achieve economically profitable sectors has always been influenced by changing economic and political conditions.

Following this background, the study's objective is to examine the effect of macroeconomic policies on the multi-sectoral performance in the Nigerian economy. This may provide basis for policy formulation and suggest direction for resource allocation among various competing sectors. Other sections remaining in the study include section two, three, four and five. Section two consists of the literature review. Section three includes theoretical framework and methodology. Section four is the presentation and discussion of regression results while section five comprises summary and concluding remarks.

2. Theoretical and Empirical Literature

2.1 Theoretical Literature

Since the early 20th century, there has been increase in the quest to step-up economic development by building capacity in industrial and complementary sectors. With respect to this, several theories have been devised to link macroeconomic policies with economic multi-sectors, however, opinion varied regarding appropriate policy-mix to adopt. The traditional neo-classical theories (Solow, 1956) and (Swan, 1956) suggest market fundamentalism, savings and investment would drive multi-sectoral development particularly industrial performance leading to industrialization and economic development. The Keynesian economics postulates government intervention, via increase government spending that would lead to increase purchasing power and rise in aggregate demand. In the contemporary, there seems to be a consensus between neoclassical and neo-Keynesian ideology coupled and called neoclassical (mainstream) synthesis.

One major theoretical fact is that macroeconomic environment has significant role to play in the growth performance of the industrial sector, (Adenikinju & Olofin, 2000; Olofin & Iyaniwura 1983). The business environment and economic policy of the government play a crucial role in the performance of industry, (Fakiyesi, 2000; Spiegel, 2007). A stable macro economy must include sound fiscal and monetary policy, high rate of domestic and saving and investment and time design in response to changes in the economic environment, (IMF, 1996; Olofin, 2000). Stiglitz (1996) reiterates that a stable competitive macroeconomic environment is attributed to having a plane's engine run in

full power before take-off. It can be implied that when a nation gets the "fundamentals right" and devises market friendly approach to maintain macroeconomic stability, development follows. Yet, the known fact is that while this theoretical premise might be a success story in some countries, for instance, the East Asian "Miracle," it is yet to produce results in Nigeria and other sub-Saharan Africa.

In Nigeria, industrial sector performance in the context of monetary policies has generated several debates. Traditional theory of monetary policy states that an increase in money supply, ceteris paribus, will lead to fall in interest rate and increase investment. Contrary to the traditional interest rate channel, financial accelerator hypotheses tag effectiveness of monetary policy to trade cycle. They assert that monetary policy will have larger output effects in a recession than in a boom, (Gertler & Hubbard, 1988), (Bernanke & Gertler, 1989) and (Azariadis & Smith, 1998) and (Mordi et al., 2014). Still, financial structure may explain why some industries are relatively more sensitive to monetary policy changes in recession versus inflation, (Peersman, and Smets, 2005). Interest rate can also be a factor. In the monetary policy transmission to the real sector, interest rate can be an important channel.

The Keynesian theory, strongly suggests that high real interest rate raises the cost of borrowing and, therefore, discourages investment and saving. Contrariwise, Goldsmith (1969); Mckinnon (1973) and Shaw (1973) hypothesize that financial liberalization leading to high interest rate and economic openness would promote economic growth through their impacts on the growth rate of capital, industrial development and the efficiency of resources allocation. It improves average productivity of investments, increases industrial performance, and provides entrepreneurial skills. This suggests that high real interest rate serves as a complement by increasing savings, increasing the channels through which saving flow and also increasing investment.

Critics of the Mckinnon-Shaw hypothesis, sometimes called neo-structuralists, argue that financial liberalization may not lead to increased growth rates of output (Burkett, 1987) and (Buffie, 1983). They contend that a fully liberalized financial sector may not be possible or desirable in a developing economy owing to poor financial sector development, (Espinnosa and Hunter, 1994). Keynesian criticisms state that major obstacles to economic development are connected with lack of effective demand and linkages between savings, investment and income. This raises doubt about the effectiveness of interest rate and other monetary policy proxies. Information asymmetries also pose a challenge.

Exchange rate policy is another critical issue in monetary policy. In an open economy like Nigeria with free capital mobility, exchange rate policy management is crucial for stabilization of macro economy. Exchange rate could be fixed or floated. Once it is floated, it becomes an important component in the transmission mechanism, (Krugman & Taylor, 1978), and (Krueger, 1983). The more open the economy, the greater the importance of exchange rate in the policy process, (Akano and Adebiyi, 2012). Therefore, exchange rate must be managed or floated in harmonization with money supply and economic openness. The efficient foreign exchange market and intervention policy must be painstakingly preserved. Economic openness is also a critical trade policy. A developing country like Nigeria, trading with diverse nations, may require some degrees of economic openness and floating exchange rate. These allow influx of foreign capital and increase demand for domestic output by foreigners.

Fiscal policy is another key macroeconomic policy. Fiscal policy refers to decision on government tax (revenue) and expenditure. When government increases spending, especially on capital projects like roads and electricity, cost of production reduces and industrial production as well as employment increases (Todaro & Smith, 2010; Okafor, 2012; and Ekpo, 2014). Similarly, if government reduces personal income tax, consumer purchasing power increases and demand for industrial production rises. However, the classical economists postulated that government spending has the potential to "crowd out" the private sector, although the sector is assumed to be the engine of growth. Being the engine of growth means that potential investors or industry owners contest with government in the market for funds. Romer (1989) and Piazolo (1995) suggest government spending may be a possible indirect measure of distortions, adding that large government consumptions may disrupt the smooth running of the market leading to inefficient allocation of resources. Conversely, Keynesian economics and public choice theory advocate that government and political leaders have role to play in an economy, (Buchanan & Tullock, 1962; Arrow 1963).

2.2 Empirical Literature

A number of studies have examined the effects of macroeconomic policies on the real sector of the economy and particularly the industrial sector. Most of these studies examine a particular policy in isolation of others. In most of the studies, the simultaneous effects of policies on the entire sector are either left-out or not painstakingly examined. While some empirical studies, however, focus on monetary policy effects, others capture fiscal or trade policy. For instance, (Chouraqui et al., 1988; Ganley and Salmon, 1997; Hayo and Uhlenbrock, 2000; Dedola & Lippi, 2000; Peersman & Smets, 2005; Ghosh, 2009; Ajide, 2013: Tule, 2013: Cachanosky, 2015) have examined both sectoral and industry effects of monetary policies. These studies find considerable cross-industry heterogeneity in the impact of monetary policy. Chouraqui et al., (1988) investigate the effect of monetary policy on real sector in selected OECD countries employing Ordinary Least Square (OLS) method. The study shows that monetary policy instruments such as interest rate and exchange rate effects on the real sectors varied with countries. However, liberalization policy has emphasized the importance of interest rate and exchange rate in price determination. They argue that effectiveness of interest rate and exchange rate on the real sector is ambiguous, therefore, over reliance on these two instruments as determinant of prices in the real sector may be damaging to growth and stability.

Ganley and Salmon, and Hayo and Uhlenbrock examine the effect of a monetary policy shock on industrial sub-sectors in the United Kingdom and Germany respectively. Ghosh (2009), carries out similar work for India. Most of these results confirm earlier studies' conclusions. Policy variables like interest rate and exchange rate have a variety of influences on the real sectors depending on policy-mix and macroeconomic environment. High positive expectations of smooth transmission of monetary policies to the real sectors should be avoided especially in an economy characterized by underdeveloped financial system. Trade policy, proxied by economic openness can be a good policy instrument to reduce adverse balance of payments and attract foreign investment, particularly in developing countries.

Although Christ (1969) undertakes simultaneous analysis of the effect of monetary and fiscal policies on the real sector, his emerges in the period the world economies, less opened and international capital mobility less flexible. His work concludes though "in

order to understand policy effects more accurately, it is especially important to have good estimates of the magnitudes of the responses of private behavior to changes in disposable income, capital gains, and private wealth and assets". There are also several studies like Argy and Salop (1979), Laumas (1991), Nas and Odekon, (1996) and Andlib et al., (2012), attempted investigation of both monetary and fiscal policies effects on industrial output. While some of these authors focus on manufacturing sector others center on multi-sectoral analysis.

For instance, the major innovation of Laumas (1991) paper is to jointly estimate the effects of anticipated and unanticipated effects of monetary and fiscal policies on real output. His study confirms past authors' findings that both fiscal and monetary policies have significant effects on real output and industrial performance. It also supports the mix effect findings of unanticipated monetary policies on the output growth. Laumas study tends to reject the hypothesis that discretionary macroeconomic policies (fiscal and monetary) are ineffective in affecting industries output growth rate. Argy and Salop findings confirm similar outcome but their studies provides more analytical impact of fiscal policy instruments.

Nas and Odekon study draws on the proposition that macro-policy variables do not affect firms' response to investment prospects directly but through their influence on firms' financial structure. In their pooled cross- section and time-series analysis of 500 largest firms, their findings conclude exchange rates affect firm performance positively while interest rates affect them negatively. The empirical work of Andlib et al., (2012), for Pakistan, employs VAR, they discover there is weak or very little coordination among the policy makers since there is weak response of monetary shock to fiscal variables and vice versa. This weak economic interrelation can affect industrial sector and multi-sectoral components of the economy. For this purpose, they conclude that more coordinated approach among the policy makers is needed in order to stabilize the entire economy, including the industrial sub-sectors and insulate them from external shocks. Lachaal and Abner (1998) examined the effect of trade policy on agriculture in Canada. In a structural econometric model, their findings suggest increasing integration of Canada into the world economy.

Adebiyi and Dauda (2004) examined the impact of trade liberalization policy on the index of industrial production in Nigeria spanning 1973-2001 in an error correction (ECM) model. Their study shows that trade liberalization policy can play significant role in promoting industrial performance in Nigeria. However, this study focuses mainly on the industrial sector and exchange rate effect is excluded. Although, the study of Afangideh and Obiora (2004) is enriched in more macroeconomic indicators, and focusing on the effect of trade policies on manufacturing tradeable goods, nonetheless, (and unlike Adebiyi and Dauda's), other industrial sub-sectors as well as multi-sectors are exempted. Meanwhile, their result shows that liberalization policy can enhance a market-driven economy and will promote competitiveness in Nigerian manufacturing activities within today's global village.

Extensive studies have been based on fiscal policies most of which confirm government expenditure is important for the Nigerian economic growth. However, these studies, some of which include (Onuorah and Akujuobi, 2012), and (Oseni and Onakoya, 2012) omit the critical effect of government capital expenditure on the real sector. In addition, while Onuorah and Akujuobi, (2012) found no significant relationship between government

expenditure and the real sector, Ogbole et al., (2011), in a vector error correction model, discovers that effectiveness of fiscal policy in stimulating economic growth varied with economic cycle; government fiscal policy effect is slightly greater during deregulation than post-deregulation period. Moreover, the studies of Oseni (2013), and Osinowo (2015), confirm early studies that government expenditure has significant effects on real output but these varied with the type of instruments used.

The recent work of Mordi et al., (2014) gives insight into the effects of monetary policy on the Nigerian real sector. The study examines the effects of monetary policy on sectoral output using quarterly data spanning the period 1993Q1 and 2012Q4 and employing the structural VAR model. The impulse response results shows that sectoral output responds heterogeneously following contractionary monetary policy shocks. Like the previous authors, their findings state that manufacturing and other key industrial sectors respond negatively with respect to monetary tightening. These review shows how significant monetary policy is to the real sector via various diverse transmission mechanisms covering interest rate and exchange rate. These studies highlighted above show that macroeconomic policy is significant in determining performance in the real sector depending on consumption pattern, macroeconomic environment and policy mix. Moreover, and most importantly, monetary policy, though often overlooked, might be a major instrument in multi-sectoral development.

3. Theoretical Framework and Methodology

3.1 The Classical Model

The major argument about sectoral development includes lopsided and balance development. The former refers to employment of resources to develop a major sector while the latter signifies simultaneous multi-sectoral development. Nevertheless, both arguments fall within the context of growth and development theory. The classical theoretical postulation states that saving, investment and labour can boost economic productive capacity and cause economic growth. The earlier work of Harrod (1939) & Domar (1947), Solow (1956), Swan (1956), are pointing to the fact that technological progress, increase in population and rising supply of capital are the foundation of economic growth. The classical model of the Cobb-Douglas function is given as: output (Y) is a function of capital stock *(K)* and labour *(L)*:

$$Y = f(K, L), \qquad f' > 0, f'' < 0 \qquad \dots\dots\dots\dots\dots \qquad (1)$$

In Majeed (2010), equation (1) can be augmented to include productivity:

$$Y_t = A_t f(K_t, L_t) \qquad \dots\dots\dots\dots\dots \qquad (2)$$

Where *Y, 'K'* and *L* are "value added", physical capital stock and labour force respectively, and *'A'* is the productivity in industrial sector. Exponential form of equation *(2)* is given as:

$$Y = Ak^\alpha L^{1-\alpha}, \qquad\qquad 0 < \alpha < 1 \quad \dots\dots\dots \qquad (3)$$

Where A measures the technological state. Output per worker, y = Y/L is given by:

$$Y = Ak^\alpha \qquad\qquad (4)$$

Where k denotes the capital-labour ratio and capital accumulation is given by

$$k = sY - (N + \delta)k, \qquad 0 < s, \; \delta < 1 \qquad (5)$$

s is the propensity to save, $N > 0$ and the rate of exogenous population growth, δ denotes the rate of depreciation of physical capital. Note that equation *(5)* is the equilibrium state of the goods market or by similarity equilibrium of *I* and saving, that is

$$I = sY \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

Setting α in equation *(4)* to zero gives the simple form of the *Ak* model proposed by Rebelo (1991):

$$y = Ak \qquad\qquad\qquad (7)$$

Where $k = K/L$, although k represents capital output ratio, but in this model, k denotes the broad measure of capital comprising both physical and human capital stock. The development of human capital is more of government responsibility in developing countries.

This paper also links the theoretical underpinning with the Mundell-Fleming model which is an extension of the IS-LM model. While the traditional (Hicks, 1937) IS-LM model deals with a relatively closed economy, the Mundell-Fleming model describes a small open economy. It portrays, in addition to the IS-LM model, the short-run relationship between an economy's nominal exchange rate and output in contrast with IS-LM model which shows only the relationship between interest rate and output. The Mundell-Fleming model maintains that when the global interest rate increases above the domestic rate, capital flows out to take advantage of this opportunity, (Fischer, 2008) and (Tule, 2013). To prevent this, at least one policy must necessarily be sacrificed. Given the money supply equation:

$$\frac{M}{P} = L(i, Y) \dots\dots L_r < 0, L_Y > O \dots\dots \qquad (8)$$

Equation 8 states that money supply or the real balance equals the demand. The demand for money is negatively related to the interest rate and positively related to the level of gross domestic product Y. Note that money supply is deflated by the price level (consumer price index), P. The balance of payments;

$$BOP = CA + KA \qquad \dots\dots\dots\dots\dots\dots\dots \qquad (9)$$

Where CA is the current account and KA, the capital account. The *IS* component is given as:

$$C = C(Y_t - T, i - E(\pi) \qquad \dots\dots\dots\dots\dots\dots \qquad (10)$$

Where C is consumption, T, taxes, $E(\pi)$, expected rate of inflation, other variables are as defined above.

$$I = I(i - E(\pi), Y_{t-1}, \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (11)$$

Where Y_{t-1} is the previous period GDP. $G = G_0$ government spending which is an exogenous variable.

$$NX = f(e, Y, Y^*) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. \qquad (12)$$

Where NX is the net exports, e, the real exchange rate, Y^* the GDP of a foreign country

The BOP component $CA = NX$, CA is the current account and NX the net export

$$KA = \eta(i - i^*) + k \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (13)$$

Where η is the level of capital mobility, i^* the foreign interest, k investments not $\neq$ related to i in previous equations, i is an exogenous variable and KA, the capital account as defined before.

This model relates possible upward pressure on the local interest rate following increase in the global interest rate in a flexible exchange rate regime. The pressure declines as the local rate tends towards equality with the global rate. Assuming a positive disparity between the global and the local rates, with the LM curve constant, capital flows out of the domestic economy. Consequently, the domestic currency depreciates and locally produced goods become cheaper. This induces exports and boost industrial performance. Rising net exports shift the IS curve to the right and continues until the domestic interest rate rises to the level of global rate. The reverse is the case in the event of a decreased global interest rate.

3.2 Methodology

The method of analysis follows previous authors in the literature. (Ganley & Salmon, 1997; Hayo & Uhlenbrock, 2000; Dedola & Lippi, 2000; Gosh, 2009; Ajide, 2013; Tule, 2013) and (Cachanosky, 2015). The objective is to examine the effect of macroeconomic policies on each Nigerian major sector. Following the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS), the sectors are agriculture, industry, building & construction, wholesale & retail trade and services. The macroeconomic policy is defined by monetary policy, proxied by monetary policy rate (MPR), fiscal policy denoted government capital expenditure as a percentage of GDP. The exchange rate movement represents trade policy while gross domestic fixed capital formation represents national saving. The model will be estimated using ordinary least squares. It will also include varying the lag of the explanatory variables where appropriate.

Since data covers a long period, 1981-2015, problem associated with time series, that is structural breaks, is expected. The common one is structural breaks; therefore, to start with, development in correction of errors in time series will be addressed. These include co-integration test, unit root test and error correction.

Model Specification

To capture the effect of macroeconomic policy on Nigerian multi-sector, a dynamic model for each sector is formulated. To begin with, we state that:

$$Y_t = f(M, F, T, GDFC) \ldots\ldots \quad (14)$$

That is performance of the sector indicated by output of the sector Y is a function of monetary policy (M), fiscal policy (F) and trade policy (T). Moreover, macroeconomic policy represented by monetary policy can be proxied by monetary policy rate (MPR); fiscal policy denoted by government capital expenditure (GOVC); trade policy denoted by real exchange rate (EXR), though the EXR can also serve as proxy for monetary policy. In addition, gross fixed capital formation denotes (GDFC) investment in year t. The model in this study is an augmented version of previous studies in the literature: (Ganley and Salmon, 1997; (Hayo and Uhlenbrock, 2000; Gosh, 2009; Ajide, 2013; Tule, 2013; Cachanosky, 2015).

$$Y_t = \delta_0 + \sum_{t=1}^{n=i} \delta_1 Y_{t-1} + \sum_{t=1}^{n=i} \delta_2 MPR_{t-i} + \sum_{t=1}^{n=i} \delta_3 GOVC_{t-i} + \sum_{t=1}^{n=i} \delta_4 EXR_{t-i} + \sum_{t=1}^{n=i} \delta_5 GDFC_{t-i} + \varepsilon_t \cdots \cdots (15)$$

Equation 15 states there is a relationship between sectoral output (Y) and 1 period *lag* of Y as well as 1 to n period lag of macroeconomic policy variables (MPR, GOVC, EXR and GDFC) denoted by subscript i. δ_0 and ε_t represent the autonomous component and error term of the model. The economic relationship between each sectoral output and monetary policy is expected to be indirect. Monetary policy rate is the interest rate commercial banks obtain loan from the central bank. This rate is fundamental since it determines all other interest rates in the economy. The higher the monetary policy rate, the higher the rate of interest available to potential investors. Conversely, when interest rate is low, hence, a lower cost of loanable funds, investors rush to borrow money and increase investment. Government capital expenditure (GOVC) is expected to have direct relationship with sectoral output. Expenditure on capital projects such as infrastructures enhances productivity and boost performances in the real sector.

Real exchange rate (EXR*)* denotes the rate at which domestic currency exchange for foreign currency. A stable exchange rate is desirable for any economy. One of the objectives of the apex bank is to ensure a stable rate of exchange to reduce risk and foster precision in businesses and investment forecasts. It is also essential for stability of domestic economy and external balances, (Ifeakachukwu and Ditimi, 2014). A rise in exchange rate refers specifically to depreciation of domestic currency and consequent negatively affects multi-sector. But on the demand-side a rise in exchange rate means fall in price of domestically produced goods and thereby encourage export. Gross domestic fixed capital formation (GDFC) is the total investment in the country measured over time. It represents amount of the national income not consumed. Sectoral output is, theoretically, an increasing function of investment.

A major gap in the literature is the failure to simultaneously examining policy effects on each on individual sector. Therefore, in order to capture the objectives of the study more specifically, specific effects of policies on each sector are examined. The dynamic relationship is, however, considered a better alternative to simple OLS regression estimation which tends to exhibits spurious results, (Yule, 1926; and Engle & Granger, 1987). With respect to this, the study dynamic estimation is based on autoregressive distributed lag (ARDL) model bound test approach to co-integration analysis.

The ARDL modeling approach is popularized by (Pesaran and Pesaran 1997), (Pesaran and Smith 1998), (Pesaran and Shin, 1999), and (Pesaran et al., (2001). Some of the advantages associated with ARDL are that it can be applied regardless of the stationary properties of the variables in the model. ARDL provides very valuable means for testing for the presence of long-run relationships between economic time-series. It allows co-integration test, and estimates short-run and long run dynamics even when the variables in question may comprise a mixture of both stationary and non-stationary time series, (Koyck 1954) , (Dhymes 1971) and (Giles 1975, 2013). The important advantage of ARDL against the single equation co-integration analysis such as Engle and Granger (1987) is that the latter suffers from problems of endogeneity while the former can distinguish between dependent and explanatory variables. It can take sufficient numbers of lags to capture the data generating process in a general – to - specific modeling framework (Laurenceson and Chai, 2003) and (Majeed et al., 2010).

The dynamic representation of equation 15, assuming one period lag in policy variables, is disaggregated in equation 16-20. The models show the relationship between individual sectoral output - of Agriculture (AGRIC), Industry (INDST), Building & Construction (BUCST), Wholesale & Retail (WSRET) and services (SERVS) - and macroeconomic policy proxies.

Model One: Macroeconomic Policy Effect on Agriculture

$$AGRIC_t = \delta_0 + \sum_{t=1}^{n=i}\delta_1 AGRIC_{t-1} + \sum_{t=1}^{n=i}\delta_2 MPR_{t-1} + \sum_{t=1}^{n=i}\delta_3 GOVC_{t-1} + \sum_{t=1}^{n=i}\delta_4 EXR_{t-1} + \sum_{t=1}^{n=i}\delta_5 GDFC_{t-1} + \varepsilon_{t1} \cdots(16)$$

Model Two: Macroeconomic Policy Effect on Industry

$$INDST_t = \delta_0 + \sum_{t=1}^{n=i}\delta_1 INDST_{t-1} + \sum_{t=1}^{n=i}\delta_2 MPR_{t-1} + \sum_{t=1}^{n=i}\delta_3 GOVC_{t-1} + \sum_{t=1}^{n=i}\delta_4 EXR_{t-1} + \sum_{t=1}^{n=i}\delta_5 GDFC_{t-1} + \varepsilon_{t2} \cdots(17)$$

Model Three: Macroeconomic Policy Effect on Building and Construction

$$BUCST_t = \delta_0 + \sum_{t=1}^{n=i}\delta_1 BUCST_{t-1} + \sum_{t=1}^{n=i}\delta_2 MPR_{t-1} + \sum_{t=1}^{n=i}\delta_3 GOVC_{t-1} + \sum_{t=1}^{n=i}\delta_4 EXR_{t-1} + \sum_{t=1}^{n=i}\delta_5 GDFC_{t-1} + \varepsilon_{t3} \cdots(18)$$

Model Four: Macroeconomic Policy Effect on Wholesale and Retail

$$WSRET_t = \delta_0 + \sum_{t=1}^{n=i}\delta_1 WSRET_{t-1} + \sum_{t=1}^{n=i}\delta_2 MPR_{t-1} + \sum_{t=1}^{n=i}\delta_3 GOVC_{t-1} + \sum_{t=1}^{n=i}\delta_4 EXR_{t-1} + \sum_{t=1}^{n=i}\delta_5 GDFC_{t-1} + \varepsilon_{t4} \cdots(19)$$

Model Five: Macroeconomic Policy Effect on Services

$$SERVS_t = \delta_0 \sum_{t=1}^{n=i}\delta_1 SERVS_{t-1} + \sum_{t=1}^{n=i}\delta_2 MPR_{t-1} + \sum_{t=1}^{n=i}\delta_3 GOVC_{t-1} + \sum_{t=1}^{n=i}\delta_4 EXR_{t-1} + \sum_{t=1}^{n=i}\delta_5 GDFC_{t-1} + \varepsilon_{t5} \cdots(20)$$

In addition, $\varepsilon_{t1}, \varepsilon_{t2}, \varepsilon_{t3}, \varepsilon_{t4}$, and ε_{t5} are the error terms in each equation. All other variables are as explained previously. It is assumed that there is a time lag between policy execution and its effect on the real sector. We also assume that in developing countries like Nigeria, policy reversal is a common place prompting frequent policy adjustments or reformulation. Therefore, for simplicity, the study examines only one period lag in each model. Data for the study are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, and National Bureau of Statistics (NBS) Annual Abstracts of Statistics.

4. Presentation and Discussion of Regression Results
Having carried out statistical tests, the time series data have structural breaks. That is the series have unit root or are not stationary at level but are stationary at different order of integration. The study objective is to examine the relationship effect and not immediate response. The auto-regressive distributed lag model (ARDL) proved to be the best estimation technique which generates realistic results. However, this study limits lag distribution to one period.

Table 4.1

Correlation Co-efficient									
	AGRIC	**INDST**	**BUCST**	**WSRET**	**SERVS**	**MPR**	**GOVC**	**EXR**	**GDFC**
AGRIC	1								
INDST	0.97695	1							
BUCST	0.99762	0.96721	1						
WSRET	0.99739	0.96672	0.998635	1					
SERVS	0.99819	0.97207	0.998461	0.99827	1				
MPR	-0.2234	-0.2625	-0.21346	-0.22325	-0.2385	1			
GOVC	0.92764	0.92092	0.908618	0.907324	0.92041	-0.2657	1		
EXR	0.84961	0.85589	0.830382	0.817002	0.82749	-0.0654	0.88293	1	
GDFC	0.96379	0.97832	0.950842	0.955161	0.96171	-0.3255	0.92579	0.80806	1

With respect to a-priori expectation, table 4.1 shows that monetary policy rate is negatively and weakly correlated with the real sector. A rise in the MPR will have a negative effect on the real sector. Government capital expenditure and gross domestic fixed capital formation conform with a-priori expectations. These variables possess positive effects on the real sector. Exchange rate is in averse with expectation. The strong and positive correlation of the variable with multisector may be due to excessive dependent on import which has overwhelmed Nigerian output sector. Increase demand for foreign goods leads to increase demand for foreign exchange and vice versa. Summary of the dynamic models of the effect of macroeconomic policy on multi-sectoral output performance in Nigeria are presented in table 4.2 below:

Table 4.2 Dynamic Regression Result

Model One   **Model Two**

Dependent Variable: Agriculture   Dependent Variable: Industry

Variable	Coef.	Std. Err	t-Stat	Prob.	Variable	Coef	Std. Err	t-Stat	Prob.
AGRIC	0.63	0.173	3.639	0.001	INDST	-0.29	0.213	-1.39	0.1740
MPR	-0.26	0.113	-2.31	0.028	MPR	-0.87	0.325	-2.66	0.0128
GOVC	-0.11	0.078	-1.43	0.164	GOVC	0.18	0.221	0.82	0.4182
EXR	0.03	0.059	0.545	0.590	EXR	0.22	0.182	1.25	0.2222
GDFC	-0.02	0.096	-0.22	0.825	GDFC	-0.06	0.272	-0.25	0.8037
R-squared = 0.46		F-stat = 4.69			R-squared =0.25		F-stat = 1.88		

Model Three **Model Four**

Dependent Variable:
Building & Construction Dependent Variable: Wholesale & Retail

Variable	Coef	Std. Err	t-Stat	Prob.	Variable	Coef	Std. Err	t-Stat	Prob.
BUCST	0.292	0.163	1.783	0.085	WSRET	0.51	0.2	2.552	0.0165
MPR	-0.08	0.112	-0.71	0.484	MPR	-0.20	0.143	-1.415	0.168
GOVC	0.071	0.077	0.924	0.364	GOVC	-0.02	0.098	-0.197	0.8453
EXR	-0.06	0.052	-1.13	0.268	EXR	0.03	0.072	0.382	0.7057
GDFC	0.243	0.095	2.548	0.017	GDFC	-0.04	0.128	-0.302	0.7652

R-squared = 0.37	F-stat = 3.29	R-squared = 0.29	F-stat = 2.33

Model Five

Dependent Variable: Services

Variable	Coef.	Std. Err	t-Stat	Prob.
SERVS	0.4575	0.180	2.536	0.017
MPR	-0.062	0.094	-0.66	0.512
GOVC	-0.004	0.068	-0.07	0.948
EXR	-0.04	0.043	-0.88	0.384
GDFC	0.074	0.081	0.908	0.372

R-squared = 0.30	F-stat = 2.35

The dynamic model is presented in table 4.2. Monetary policy is negatively related with agricultural and industrial sectors and significant at 5% in both sectors. In other words, monetary policy rate and agricultural performance change in different directions. This negative directional change holds in the industrial sector. A rise in MPR will result in decline in agricultural output as well as industry. MPR is also negatively related with other sectors though not significant. Government capital expenditure has mixed effect on the real sector. The relationship is positive with industry and building & construction but negative with other sectors. Change in policy on capital expenditure is not significant in the multi-sectoral relationship. Exchange rate effect is ambiguous and not significant. However, the rate is exogenously determined and likely to be significant in Nigeria as increase import demand continue to put pressure on the dwindling foreign reserves. Nigerian investment in Building & construction and services are affected positively by the level of investment, however, the effect is negative with respect to key real sectors like Agriculture and industry.

5. Concluding Remarks

This paper has examined the effects of a macroeconomic policy on the real sector in the Nigerian economy. The real sector comprises agriculture, industry, wholesale & retail, Building & construction and services. This classification follows the CBN and NBS of statistics method. The period under review ranges from 1981 to 2015. The findings provide evidence for the contention that macroeconomic policy is important to Nigerian multi-sectoral configuration. The study shows that monetary policy rate (MPR) has negative and significant effect on agriculture and industry. This means that rising interest rate in Nigeria hinders agricultural and industrial performances. Interest rate is the cost of borrowing and when too high, it abysmally affects farmers' ability to borrow, invest and increase production. Potential industrialist ability to expand and increase productivity reduces with high interest rate. This confirms findings in the literature that essentiality of low interest rate to the real sector is necessary to promote economic growth. The paper also shows that other macroeconomic policies bond effect on the real sector is ambiguous. For instance, Investment in unproductive activities is high in Nigeria. In addition, percentage of government recurrent expenditure has been over 80% for over a decade and this also adversely affected investment in capital projects.

Monetary policy rate is a key variable monetary authority should carefully adjust to prevent multi-sectoral growth bias and asymmetry. The high market interest rate, driven by the monetary policy rate or minimum rediscount rate, would project declining forces in the real sectors' productivity unless monetary authority brings down the MPR to economic reality. Nigeria should learn lesson from the advanced countries where MPR or central bank rate falls below 3%. The dynamism intricacy of macroeconomic policy must be painstakingly underscored and administered by both monetary and political authorities for the realization of growth and development of Nigeria.

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