Impact of Monetary Policy on Economic Diversification in Nigeria: Further Empirical Analysis

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

One of the key objectives of the government's economic policy is the prosperity and stability of the economy. It intends to achieve this by increasing the economy's competitiveness in the global economic arena. However, besides the macroeconomic policy, another key determinant of an economy's competitiveness is the extent of its diversification, understood in this context to mean the degree to which the economy moves away from a dominant income-earning sector or product to other ones. In view of this, study examined the impact of monetary policy on economic diversification in Nigeria using data for the period 1991 to 2021 and the Autoregressive Distributed Lag (ARDL) bounds testing approach. The study made use of diversification index as the dependent variable, money supply, real exchange rate, gross fix capital formation, labour force ,as independent variables. Secondary time series data were collected from the Central Bank of Nigeria Statistical Bulletin, National Bureau of Statistics (various years/issues). Descriptive statistics and multiple regression analysis based on the ARDL technique. Based on the results obtained, the study shows that money supply, gross fix capita formation and labour force affects economic diversification positively while real effective exchange rate affects economic diversification negatively. The study therefore recommends that monetary authorities should be encouraged to increase money supply as this has similar benefit of increasing private consumption. Furthermore, maintaining a favourable external reserves should be pursued by the monetary authorities.

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1. INTRODUCTION

An economic policy is a course of action that is intended to influence, manipulate or control the behaviour of the economy. The government typically formulates economic policies. Examples of economic policies include decisions made about government spending and taxation, redistribution of income, and the supply of money. Policy "makers undertake three main types of economic policy. These are fiscal policy which refers to the use of government revenue collection (taxation) and expenditure (spending) to influence the economy, trade policy which comprises of government activities towards regulating and promoting trade in an attempt to increase the productive capacity of the economy, and monetary policy which involves changes in the supply of money and credit. [1].

United Nations Framework Convention on Climate Change (2019) defined Economic diversification as the process of shifting an economy away from a single income source toward multiple sources from a growing range of sectors and markets. A diversified economy is an economy that has a number of different revenue streams and provides nations with the ability for sustainable growth because it does not rely on one particular type of revenue. Thus, diversification provides a nation with the security and reliability that it needs, so that if one economic revenue stream fails, the nation knows that it has several other options for revenue (Ogbonna, 2017). Diversification can take place through either horizontal diversification (new opportunities are sought for new products within the same sector, e.g. mining, energy or agriculture) or vertical diversification, which entails adding more stages of processing of domestic or imported inputs. Thus, vertical diversification encourages forward and backward linkages in the economy, as the output of one activity becomes the input of another, thus upgrading the value-added produced locally. This then makes the process of economic development to be a change in the social and economic structure as countries move from producing poor-country goods to rich-country goods [2].

The role of monetary policy in the process of diversification in Nigeria has been a growing concern. It is apparent that the government had embarked on several policies aimed at improving the growth of the Nigerian economy through diversification over time since the country's independence [3,4,5], yet the economy has remained tied to the apron strings of one sector in spite of many decades of diversification experimentation. In most developing countries including Nigeria, export of primary products remain one of the few channels, which significantly sustain and contribute to higher income per capita growth rates of the country. This is as a result of high dependence on a product or a narrow export basket. This has inevitably subjected the economy to precarious global demand trends [6,7]. A large and vibrant export basket mix is thus becoming the only way to escape from these particular constraints.

At the national level, economic diversification takes place by reducing a country's overdependence on a narrow economic base. In resource-dependent countries, the process entails moving the productive base away from the extractive sector by supporting manufacturing and other non-resource sectors [8-11]. This process can be defined as industrialization. Although governments possess powerful policy instruments in their policy toolbox to stimulate structural change and the diversification process, choosing the right instruments determines the level of success in the long run.

Herrick and Kindleburger [12] opined that economic diversification is part of, but distinguished from, economic development, as the latter implies not only difference of output, but also changes in the technical and institutional arrangements by which output is produced and distributed. Nigeria's export diversification drive and experience has been reactive and peripheral. They were not inspired by a genuine resolve to address the structural imbalances in the Nigerian economy. From the late 1960s till date, only one commodity still account for over 70% of Nigeria's annual export. According to Ogege and Mojekwu [13], Nigeria is endowed with various kinds of resources needed to place her amongst the top emerging economies of the world. Nigeria is the 26th largest economy in the world and the biggest in Africa where it is the leading oil exporter with the largest natural gas reserves [14]. According to World Trade Organization [15], as a result of its 2014 rebasing exercise, Nigeria's GDP almost doubled from US$270 billion in 2013 to US$510 billion in 2014, and its economy has become more services

driven (about 61% of GDP in 2016). This GDP increase of about 90% resulted from, inter alia, re-estimation of the contributions of certain sectors of the economy such as telecommunications, entertainment, and retail, which were previously not captured or under reported, the informal sector was re-estimated to account for about 44% of GDP [16-19].

While there is no blueprint for successful diversification, careful application of economic theory and macroeconomic policy and available empirical evidence can help policy-makers to avoid mistakes and learn from successful experiences. This study therefore provides the empirical evidence of the impact of monetary policy on economic diversification in Nigeria.

1.1 Statement of the Problem

Despite abundant natural and human resources, Nigeria remains a poor country [20]. Up to the end of the 1960s, the country was self-sufficient in food production and even a net exporter of agricultural produce. Since the early 1970s however, crude oil rapidly became a major foreign exchange earner and contributor to GDP. Other sectors of the economy, especially agriculture and manufacturing, rapidly got relegated to the background in terms of economic relevance. The result is that the non-oil sector of the economy has stagnated, while crude oil revenues have not been managed effectively to stimulate desired growth levels and sustainable economic development.

The economy is skewed towards consumption rather than investment, with gross domestic investment (GDI) to GDP ratio hovering at 13 to 14 per cent. Nigeria's economy is highly dependent on the oil and gas sector. Although the sector accounts for just 10 per cent of GDP, it represented 94 per cent of export earnings and 62 per cent of Government revenues (Federal and State) between 2011 and 2015. As a result of the undue dependence of the economy on oil, the crash in oil prices resulted in foreign exchange reserve's decline from USD32 billion in January 2015 to USD25 billion in November 2016 – from a high of USD53 billion in 2008 (World Bank 2016). As a result, the naira depreciated sharply, losing almost half of its value against the dollar. The Central Bank of Nigeria [21] annual report states that foreign direct investment (FDI) declined sharply from a peak of USD8.9 billion in 2011 to USD3.1 billion in 2015 and did not recover as at 2016.

Falling oil revenues widened the Federal Government deficit from N1.2 trillion in 2013 to N1.4 trillion in 2015, and an estimated N2.2 trillion in 2016. Fiscal sustainability became therefore a critical challenge for Nigeria. [21]. Iniodu [22] reiterated that the near total dependence on a mono product (oil), which operates on a quota system, has rendered the Nigerian economy vulnerable to fluctuations in world prices of petroleum and its products. The diversion of attention from agriculture, which was once the mainstay of the economy occurred because of the favourable oil revenue windfalls of the 1970s.

The performance of the non-oil export sector such as agricultural sector, manufacturing sector and solid minerals sector in the past three decades leaves little or nothing to be desired in spite of the efforts to promote non-oil exports in Nigeria. Abogan, Akinola and Baruwa [23] noted that an assessment of the trend and patterns of activities in the non-oil sector of Nigeria revealed that despite the various policies, strategies and reform programmes, the contributions of the sub-sectors of this sector have been dismal, disheartening and below its full potential. According to CBN [24], the share of non-oil export in the country's total export earnings was as low as 0.3 billion Naira in 1981, accounting for just 2.7% of total export earnings. In 1986, non-oil export earnings stood at 0.6 billion Naira, accounting for 6.7% of export earnings that year. Ten years on in 1997, the same sector netted 29.2 billion Naira, which is only 2.35% of total export earnings. The oil sector therefore accounts for the larger 97.65% of export earnings. This dismal trend however improved marginally in recent years as the non-oil sector accounted for 7.35% (913.5 billion Naira), 7.4% (656.8 billion Naira) and 7.6% (1,074.9 billion Naira) in 2011, 2016 and 2017 respectively.

The continued unimpressive performance of the non-oil sector and the vulnerability of the oil sector thus dictate the urgency for a reappraisal of the thrust and contents of Nigeria's development policies and the depth of commitments to their implementation. Indeed, the need for a change in the macroeconomic policy focus and diversification is imperative if the Nigerian economy is to return to the path of sustainable growth and external viability.

All governments in post-independent Nigeria had indicated diversification of the economy away from oil as the solution to Nigeria's economic

challenges. There have therefore, been countless macroeconomic policies, plans and actions over the years to ensure the diversification of the economy ranging from the First National Development Plan (1962-1968), the Rolling Plans, the Structural Adjustment Plan (1986), Vision 20:2020 and the most recent Economic Recovery and Growth Plan (ERGP 2017-2020). In spite of these many and varied plans and policies, spanning several decades and gulping dizzying resources, the country still remains heavily dependent on crude oil for its economic sustenance, foreign exchange earnings and fiscal revenue. Statistics on the impacts of monetary, fiscal and trade policies on the economy leave a lot to be desired. Inflation rate was 7.7 percent in 1982. By 1996, it was 29.3 percent and 17 percent in 2001. This fell to 8.0 percent in 2014 but rose to 16.5 percent in 2017 [25]. Similarly macroeconomic variables like money supply, tax revenue, government expenditure, foreign direct investment and capital formation have seen astronomical rise in their values over time without a commensurate positive impact on the diversification and growth of the economy. It is depressing to observe that after more than five decades of efforts at diversifying the Nigerian economy, by several governments in Nigeria even with serious efforts both in policy and implementation, diversification of the Nigerian economy away from oil has remained elusive [26,27].

This impotence in monetary policy and actions aimed at the diversification of the Nigerian economy motivated this research. The study therefore seeks to answer the following research question: What is the impact of monetary policy on economic diversification in Nigeria?

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Empirical Literature

2.1.2 Monetary policy and economic diversification

Extensive work has been done in an attempt to establish the impact of monetary policy on economic diversification, yet with little consensus to date. Some studies have confirmed limited or no impact of monetary policy on economic diversification. Mutuku and Koech [28] applying the recursive VAR methodology on time series data from 1997-2010 estimated the impact of monetary and fiscal policy shocks on economic

growth in Kenya and discovered that monetary policy (both money supply and short-term interest rates) has insignificant influence on real output growth and diversification. They argue that the weak nexus is attributed to weak structural, institutional and regulatory framework.

Using the vector auto regressive (VAR) model to measure the effect of monetary policy on economic diversification and growth in Kenya, Kamaan (2014) also found that monetary policy does not have a significant impact on economic diversification. The results are corroborated by Montiel, Adam and O'Conell (2012) who estimated the Monetary Transmission Mechanisms (MTMs) in Tanzania covering the period 2002–2010 using both recursive and structural VAR. they found that monetary policy had no output effects.

Using the econometric regression model analysis on a monetarists' approach, Lashkary and Kashani [29] studied the impact of monetary variables on economic growth in Iran during the period 1959 to 2008 and found no significant relationship between the money volume and real economic variables, economic growth, employment and diversification.

It is however, worth noting that a number of empirical studies confirm that monetary policy is crucial for economic diversification. Havi and Enu [30] examine the relative importance of monetary policy and fiscal policy on economic diversification in Ghana over the period of 1980 to 2012. The Ordinary Least Squares (OLS) estimation results revealed that money supply as a measure of monetary policy had a positive significant impact on the Ghanaian economy.

Vinayagathasan [31] estimates the impact of monetary policy on the real economy using a seven-variable structural VAR model by utilizing monthly time series data from Sri Lanka covering the period from January 1978 to December 2011. The study found that interest rate shocks had a significant impact on diversification in accordance with the economic theory. It also finds that positive money shock provides significant but inconsistent results on output. Output declines rather than increase.

With the use of OLS method and correlation matrix, Kareem, Afolabi, Raheemand and Kashir. (2013) examined the impact of fiscal and monetary policies on the growth and diversification of the Nigerian economy, with

particular reference to the period between 1998 and 2008. They found that monetary variables of narrow money and" broad money are significant policy variables that positively affect real GDP growth rate and diversification in "Nigeria.

Davoodi, Dixit and Pinter [32] used three variants of Structural VARs on monthly data sets from 2000 to 2010 to determine MTMs in the East African Community. The study found that MTM tends to be generally weak when using standard statistical inferences, but somewhat stronger when using non-standard inference methods. An expansionary monetary policy (a positive shock to reserve money) increases output significantly in Burundi, Rwanda and Uganda. However, they also found that an expansionary monetary policy (a negative shock to policy rate) increases output and encourages diversification in Burundi, Kenya and Rwanda.

The result obtained by Fasanya, Onakoya and Agboluaje [33] are similar to that of Kareem et al [34]. They examined the impact of monetary policy on growth and economic diversification in Nigeria using the Error Correction Model (ECM) on time-series data covering 1975 to 2010. They revealed that a long-run relationship exists among the variables and that inflation rate, exchange rate and external reserve are significant monetary policy instruments that drive diversification in Nigeria in accordance with theoretical expectations. Money supply was found to be insignificant.

Milani and Treadwell [35] used a small-scale DSGE model to disentangle unanticipated and anticipated monetary policy shocks and study their effects. The estimation used likelihood-based Bayesian methods on US data from 1960 to 2009 on the output gap, inflation, and the federal funds rate as observable variables. They showed that the unanticipated monetary shocks have a smaller and more short-lived impact on output and a large, delayed, and persistent effect due to anticipated policy shocks. The overall fraction of economic fluctuations that could be attributed to monetary policy remained limited.

Chaudhry, Oamber and Farook [36] investigated long-run and short-run relationships of monetary policy, inflation and economic diversification in Pakistan using co-integration technique and the ECM for the period from 1972 to 2010. They found that monetary policy variable of call money was insignificant in the short run but positively significant in the long run.

Jawaid, Quadri and Ali [37] probed the effect of monetary, fiscal and trade policy on economic diversification in Pakistan, using the annual time series data from 1981 to 2009. They employed the co-integration and ECM revealing the existence of positive significant long-run and short-run relationship between monetary policy (money supply) and economic diversification. Senbet [38] also investigated the relative impact of fiscal versus monetary action on diversification in the USA using the VAR approach and revealed a positive significant impact of money supply on economic growth. Their findings are congruous with Adefeso and Mobolaji (2010) that also studied the relative effectiveness of fiscal and monetary policy on economic diversification in Nigeria using the co-integration technique and error correction mechanism, based on annual data from 1970-2007.

Employing the OLS approach, Nouri and Samimi [39] examined the relationship between money supply and economic growth for the period during 1974 to 2008 in Iran. They found a positive significant relationship between money supply and economic growth and diversification. Ogunmuyiwa and Ekone [40] investigated the relationship between money supply and economic growth in Nigeria between 1980 and 2006. The OLS and ECM revealed a positive impact of money supply on economic growth both in short run and long run.

Moursi and El Mossallamy [41] analysed monetary policy in Egypt and its effect on growth and diversification by using the Bayesian approach to estimate a dynamic stochastic general equilibrium (DSGE) model for a small closed economy. Monthly time series data for the sample period 2002 to 2008 was utilised. They found that the impact of monetary policy negative shock is significant on output, indicating that expansionary monetary policy is capable of stimulating economic growth and diversification without imposing too much pressure on prices.

Amarasekara (2009) utilised both recursive VAR and semi-structural VAR methodology on monthly data for the period from 1978 to 2005 to assess the effects of monetary policy on economic growth and diversification in the small open developing economy of Sri Lanka. The results from recursive VAR were consistent with results from the semi-structural VAR and they revealed a negative significant impact of interest rate on growth. Positive innovations decreased GDP growth. However, when money growth and

exchange rate are used as policy indicators, the impact on GDP growth contrasts the established findings/theory.

Suleiman, Wasti, Lal and Hussain [42] employed the Johnson co-integration test to investigate the long run relationship between money supply (M2), public expenditure, and economic diversification in Pakistan using annual data for the period 1977-2007. They found a positive relationship between money supply (M2) and economic diversification in the long-run.

Khabo and Harmse [43] estimated the impact of monetary policy on South Africa, using OLS on the annual data series from 1960 to 1997 and found that money supply (M3) and inflation significantly related to economic diversification and growth in accordance with economic theory.

Agosin, Alvarez and Bravo-Ortega [44] examined the determinants of export diversification around the World for a group of 79 countries covering the period 1962 to 2000. The study employed generalised methods of moments (GMM) technique. The results suggest the existence of robust evidence across specifications and indicators that trade openness induces higher specialisation. In contrast, financial development was insignificant to diversifying exports. The result also showed a positive effect of real exchange rate volatility on concentration while exchange rate overvaluation had insignificant effect on concentration [45,46]. The study also showed that human capital accumulation contributes positively to diversify exports. Further, the findings of the study also revealed that improvements in the terms of trade tend to concentrate exports. This effect is lessened for countries with higher levels of human capital; suggesting that countries with higher education could take advantage of positive terms of trade shocks to increase export diversification.

2.2 Theoretical Framework

2.2.1 Theories of economic diversification

1. Economic Base Theory

The economic base concept emerged in the 1920s. This theory was developed by Robert Murray Haig in his work on the Regional Plan of New York in 1928. In a nutshell, it posits that activities in an area divide into two categories: basic and non-basic. Basic industries are those exporting from the region and bringing wealth from outside, while non-basic (or service) industries support basic industries.

Economic base theory" (also called export base theory) views regional economic growth as being driven by exogenous final demands, primarily exports. Industries contributing to "exogenous (or external) final demand are termed basic industries and those serving primarily endogenous (or internal) demand are termed non-basic industries. The distinction between a region's basic and non-basic sectors is often illuminated by calculating a location quotient (LQ) as follows:

$$LQ = \frac{S_i^{Reg}}{S_i^{US}} \quad LQ = \frac{e_i/e}{E_i/E} \qquad (1)$$

Where:

e_i = Local employment in industry i
e = Total local employment
E_i = Reference area employment in industry i
E = Total reference area employment.

The base year is assumed identical in all of the variables above.
It would be noted that economic base theory depends on changes in manufacturing and trade activities, as causing growth or decline, but its criticism lies in the fact that today, export activities involve many services, and the comparative advantage of an area may well lie in the services it produces.

Furthermore, the concept of economic base theory is that of a trading region, but in practice, economic base concepts are often applied to areas that fit the concept. One can speak of the economic base of different states in Nigeria, but to go on and compare such areas or states using economic base techniques is not very meaningful.

2. The Location Quotient Theory

The Location Quotient theory quantifies the concentration of a particular industry, cluster or occupation in a region compared with its concentration in the country. In more exact terms, Location Quotient (LQ) is a ratio that compares a region with a larger reference region according to some economic activity (Sentz, 2011). LQ can also be used by a country to determine the composition of a particular region. The sectors with LQ greater than one are considered as export (basic) sectors and part of their output is assumed to be exported outside

the region. Sectors with LQ less than one are known as non-basic (indigenous) sectors and their outputs are assumed to be sold within the local economy.

Thus, the LQ compares the regional share of economic activity to the corresponding share found at the national level. An LQ of one indicates that the share of an industry in the regional economy and the national economy are the same, a value of the LQ greater (or smaller) than one means that regional economy has a greater (or smaller) share of that industry in its economy than nationally.

LQ greater than 1 is one of the most widely used measures of specialization in a given sector and industrial concentration of a regional economy. The summation of sectoral LQs, also referred to as the coefficient of specialization, is used as a measure of regional specialization (Hoover and Giarratani, 1985). Similarly, the reciprocal of the sum of location quotients (LQs) weighted by industry shares gives the Hachman index of economic diversity as follows:

$$\text{Hachman Index} = \cfrac{1}{\sum_{i=1}^{n}\left[\left(S_i^{Reg} \Big/ S_i^{US}\right) x S_i^{Reg}\right]}$$

$$= \frac{1}{\sum_{i=1}^{n}\left[LQ_i x S_i^{Reg}\right]} \tag{2}$$

where SiReg is a region's share of income in the ith industry, SiUS is the share of employment in the ith industry, and N is the number of industries. The Hachman index is an indicator that measures how closely the region's industry employment distribution compares to that of the U.S. This measure is bounded between 0 and 1, where 1 means the region has exactly the same industrial structure as the U.S., and 0 means it has a totally different industrial structure.

3. Regional Business Cycle Theory

As in economic base theory, the regional economic instability in regional business cycle theory is also assumed to result from fluctuations in the demand for exports, especially those with high income elasticity of demand (such as luxury goods). It has been hypothesized that economic instability can be explained in terms of differences in the mix of stable and unstable sectors. To test this relationship, a region's share of stable or unstable sectors has been used as a measure of economic diversity.

Durable goods generally tend to have high short-run income elasticity of demand and hence it is assumed that a region will experience more cyclical fluctuations the higher the share of durable goods in its export mix or the higher the share of employment or income in durable goods sectors (Malizia & Ke, 1993). Thus, the region's employment or income share in the durable goods sectors has also been widely used as a measure of economic diversity, with a smaller share of durable goods in total economic activity indicating higher diversity or vice versa (Domazlicky, 1980).

Another hypothesis under the regional business cycle theory is that the more similar a region's sectoral composition is to that of the nation's, the higher will be the economic stability. This hypothesis is tested using the national averages index (NAI), calculated as follows:

$$\text{NAI} = \sum_{i=1}^{N} \frac{\left(S_i^{Reg} - S_i^{NIG}\right)^2}{S_i^{NIG}} \tag{3}$$

Where SiReg is the ith sector's share of economic activity in the region, SiNIG is Nigeria's average of share of economic activity in the ith sector, and N is the number of sectors. As the region's share of economic activity approaches the Nigeria share for all sectors, the NAI approaches zero. As the region's shares diverge from Nigerian economy, the NAI becomes increasingly larger. The NAI can be considered a relative measure of economic diversity because it measures the amount of disparity between the Nigeria and the region's industry distributions. The NAI is accepted as a more reasonable standard with which to gauge a region's industry structure than other alternatives (Sherwood-Call, 1990)

2.3 Conceptual Framework

2.3.1 Monetary policy

Monetary policy has to do with the management of the money supply, the rate of interest and the exchange rate, although some economists treat changes in the exchange rate as a separate policy. The main monetary policy measure, currently used in most countries, is changes in the rate of interest.

Monetary policy includes all monetary and non-monetary decisions and measures aimed at affecting the monetary system. It is a policy employing the central banks control of the supply

of money as an instrument for achieving the objectives of general economic policy [47,48]. Shaw defines monetary policy as any conscious action undertaken by the monetary authorities to change the quantity, availability and or cost of money or credit (cited in Jhingan, 2004:220). Since the common objectives of economic policy are attainment of full employment, price, stability, balance of payments equilibrium and rapid economic growth, the effectiveness of monetary policy will depend upon the degree of success in achieving these objectives. In other words, these are equally the objectives of monetary policy (Lipsey & Steiner, 1981). Full employment means, the absence of involuntary unemployment. A situation in which everybody who wants to work gets work. Aggregate employment is inelastic in response to an increase in the effective demand for its output in this situation. It is also seen as a situation where there are more vacant jobs than unemployed people so that the normal lag between losing one job and finding another will be very short.

Price stability is another policy objective of monetary policy. When prices are unstable, these means that there are fluctuations in prices and this leads to uncertainty and instability. So a policy of price stability keeps the value of money stable, eliminates cyclical fluctuations, reduces inequalities of income and wealth, enhances economic stability, secures social justice and promotes economic welfare (Byrns & Stone, 1992).

Monetary policy promotes a sustained economic growth by maintaining equilibrium between total money demand and economy's total production capacity, encouraging savings and investments by minimizing fluctuations in prices and business activities.

Another objective of monetary policy is the maintenance of an equilibrium balance of payments position. Balance of payments is a statistical record of all the economic transactions between residents of the reporting country and the residents of the rest of the world during a given time period (Pilbeam, 1998). A balance of payments disequilibrium occurs when we have a deficit or surplus balance of payments.

2.3.2 Economic diversification

Le-Yin Zhang [49] saw economic diversification as the process in which a growing range of economic outputs is produced. It can also refer to the diversification of markets for exports or the diversification of income sources away from domestic economic activities (that is, income from overseas investment). Diversification according to Ayeni (1987) and Iniodu [22] implies movement into new fields and stimulation and expansion of existing traditional products. Diversification is not necessarily opposed to specialisation, but requires that resources be channelled into the best alternative uses. United Nations Framework Convention on Climate Change (2019) defined Economic diversification as the process of shifting an economy away from a single income source toward multiple sources from a growing range of sectors and markets. Traditionally, it has been applied as a strategy to encourage positive economic growth and development.

Economic diversification has been used as a strategy to transform the economy from using a single source to multiple sources of income spread over primary, secondary and tertiary sectors, involving large sections of the population. The objective has always been to improve economic performance for achieving sustainable growth. For example, building resilience against fluctuations in extra-regional economic activity, reducing vulnerability to income loss due to volatility of product price on the international market, creating job opportunities, alleviating poverty and actually breaking away from the vicious cycle of poverty in which most African countries are presently languishing.

Diversification in the present Nigerian economic context simply means creating new avenues for economic growth. It involves using the right strategy to boost revenue generated from other sectors of the economy. This means, facilitating growth of other sectors of the economy and through this, reversing the effects of the economic crisis and returning the economy to a sustainable growth path. It, however, will not necessitate a neglect of the oil and gas sector but entails a maximization of the revenue potentials of all the sectors.

Economic diversification, either in terms of the diversity of economic activities or markets, is a significant issue for many developing countries, as their economies are generally characterized by a chronic deficiency of diversification. They have traditionally relied heavily on the production of primary commodities that are predominantly vulnerable to climate variability and change.

The key advantages of diversification include minimising risk of loss – if one investment performs poorly over a certain period, other investments may perform better over that same period. It reduces the potential losses of your investment portfolio from concentrating all your capital under one type of investment. It also aims to maximize return by investing in different areas that would each react differently to the same event. Most investment professionals agree that, although it does not guarantee against loss, diversification is the most important component of reaching long-range financial goals while minimizing risk.

Several measures of diversification exist in the literature. These measurement methods can be classified by the theoretical concept that they apply to measure diversification. These include the share of sectors in GDP, the share of sectors in exports (export concentration), the dependence of a country on the export of a good or commodity, and the employment share of sectors. Most of the theories used to measure the level of economic diversification link it to levels of employment, exports or income.

Indices that measure absolute specialization indicate the level of specialization in a country (for example, when a small number of industries exhibit high shares of the overall employment of the country or the income of the country). In general, the indices can be classified into two groups: one group that measures a country's absolute specialization (e.g. ogive index, entropy index, Herfindahl-Hirschmann index, Gini index, diversification index), and a second group that measures a country's economic structure from a reference group of industries (e.g. Theil index, relative Gini index, inequality in productive sectors) (United Nations 2016).

This study adopts diversification index as a reliable measure of economic diversification. This is because it is the highest benchmark of diversification and represents equal distribution of employment across sectors.

2.4 Measures of Economic Diversification

In measuring economic diversification, several scholars have used different methods for underdeveloped, developing and developed economies. The Input–output model, which is an economic analysis was developed and applied by the 20th-century Russian-born United States economist Wassily W. Leontief, in which the interdependence of an economy's various productive sectors is observed by viewing the product of each industry both as a commodity demanded for final consumption and as a factor in the production of itself and other goods. A positive relationship existed in the study carried out by the author between the dependent and the independent variables.

However, Wagner and Deller (1998), in their study to examine the impact of economic growth on export diversification on sub-Sahara African, argue that the intent of this type of analysis is to address the association between a given level of diversity with growth and stability, or how a given level of diversity at time t affects growth and stability in time t + i. The empirical application is however, quite limited mainly due to lack of consistent I-O data over time.

Entropy measures, as used by Saibu and Loto [50] within the regional economic diversity literature, explicitly structures diversity as a level of distribution of economic activity across a range of sectors. Within this framework, therefore, an ideally diversified economy would have equal levels of activity across industries. The greater the concentration of activity in a few industries, the less diversified, or more specialized, the economy. This measure compares the existing economic activity distribution among industries in a country with an equi-proportional distribution and is calculated as the negative sum of employment shares multiplied by the natural logarithm of employmen"t shares of each single industry, as follows:

$$\text{Entropy index} = \sum_{i=1}^{n} S_i \ln\left(\frac{1}{s_i}\right) = -\sum_{i=1}^{n} S_i \ln(S_i) \quad (4)$$

where n is the number of sectors, S_i is the share of economic activity in the ith industry and ln is the natural logarithm. Considering that equally distributed economic activity is considered more diverse, higher entropy index values indicate greater relative diversification, while lower values indicate greater relative specialization. If employment is used as an indicator of economic activity, the equal distribution of employment among all industries will result in a higher entropy index. The minimum value of zero would occur if employment were concentrated in one industry (i.e. maximum specialization). Higher Entropy index values indicate greater relative diversification, while lower values indicate relatively more specialization.

The ogive index of economic diversity measures the distribution of economic activity among sectors in a country. Following McLaughlin (1930) and Tress (1938), the Ogive index "of economic diversity can be constructed as follows:

$$\text{Ogive Index} = \sum_{i=1}^{I} \left(bi - \frac{1}{I} \right)^2 \tag{5}$$

Where I is the number of sectors in a country and bi is the sectoral share of economic activity for the ith sector. An even distribution of economic activity among sectors represents higher economic diversity. With N sectors, an equal distribution implies that Si is equal to 1/N, the ideal share for each sector, and the ogive index equals zero, meaning perfect diversity. The ogive index can also be explained as a linear transformation of Hrischman-Herfindahl Index (HHI) Palan, (2010).

In 1945, Albert Hirschman observed that in measuring diversification, it is important to take into account, not only equality of market shares, but also the number of total competitors. Therefore, he argued that any index purporting to measure industrial concentration should increase as the dispersion in market shares increase and decrease as the number of firms increase. The Hirschman diversification index as a measure of diversification is calculated as:

$$H1 = \sqrt{\sum_{i=1}^{N} \left[\frac{xi}{X}\right]^2} \tag{6}$$

Where: H1 is Hirschman diversification index, xi is the export value of specific commodity i. X is the country's total export and N is the total number of export sectors. A higher H1 indicates greater concentration of exports on a few commodities and a lower H1 indicates more diversity.

Five years later, Orris Herfindahl, based on his Ph.D dissertation, independently reached very similar conclusions. Their independent works are now collectively known as the Herfindahl-Hirschman Index. This study however intends to use the Herfindal Index of diversification as a measure of diversification. It is thus calculated as:

$$\text{Herfindal Index (HI)} = \sum_{i=1}^{N} S_i^2 \tag{7}$$

$$\text{Where } S_i^2 = \left[\frac{xi}{X}\right]^2$$

Where, HI is Herfindal Concentration Index. N = total number of categorized income sources in the economy. , xi is the export value of specific commodity i. X is the country's total export and N is the total number of export sectors. It is the most widely used measure of trade and commodity concentration (Samen, S. 2010).

Herfindahl index, is a widely-used measure of market concentration in the industrial organization literature (Scherer, 1980). It has also been used as a measure of economic diversity (Tauer, 1992). The Herfindahl index indicates the extent to which a particular regional economy is dominated by a few firms. Herfindahl index is also known as concentration index. The Herfindahl index varies from 0 (when the economy has a large number of industries, with small and equal employment shares – i.e. high diversity) to 1 (when one sector accounts for all economy's employment – i.e. full specialization). Thus, a decline in the index signifies less concentration in the dominant industry or greater diversification. An increase indicates more concentration in the dominant sector or greater specialization. The Herfindahl concentration index was transformed to measure diversification index as shown in Equation 2.12:

$$HD1 = 1 - (HI) \tag{8}$$

The Herfindahl Diversification Index (HDI) has direct relationship with diversification, it, in this case, takes the value of zero in case of complete specialization or concentration while a unity index indicates perfect diversification.

Thus, according to Ogive, Entropy and Herfindahl measures, a fairly equal distribution of employment among a large number of industries mean higher level of economic diversity. One limitation of these indexes is that they do not tell whether total regional employment is increasing or decreasing. For example, increased diversification may come with a decrease in total employment, which may not be a desired outcome. Ideal would be to have increased diversity with employment gains. Following McLaughlin (1930) and Tress (1938), it has been hypothesized that the more diverse the economic activity of a region, the more stable is its economic performance.

These equi-proportional diversity measures has been questioned both theoretically and empirically. On the theoretical front, Conroy (1972, 1974 and 1975), pointed out that the

selection of an equal distribution of activities across sectors as the reference point for diversity is not based on any a priori rationale and is indeed, quite arbitrary. Two additional theoretical concerns include the fact that these measures do not account for any form of inter-industry linkages, and the number of industry sectors is usually fixed and not allowed to vary by region. They suggested that perhaps equality in the distribution of activities is not the key, but rather the specialization in specific industries that tend to be inherently stable.

As noted by Brown and Pheasant (1985), the choice of an equal distribution of activities across sectors as a reference point in calculating the entropy measure and the use of national economy as a reference point in calculating the Hirschman index are quite arbitrary. This makes both indexes sensitive to the level of industry aggregation and the choice of reference economy. Wagner and Deller [51] assert these diversity measures are narrowly defined usually focusing on the employment distributions across industries and failing to account for inter industry linkages and the relative size of the economy.

Most conventional measures of economic diversity, such as entropy and Hachman indexes, only provide an aggregate picture of industrial structure, with little or no information on the underlying economic issues that have caused the values and changes in the indexes. The indexes also do not shed light on what industries should be targeted for recruitment, retention and expansion for promoting economic growth and stability, as opposed to promoting diversity for the sake of diversity.

Similarly, regions defined as highly specialized by the entropy approach, were, in fact, characterized by relative economic stability. Making reference to Kort (1981), Wagner and Deller found that policy results were positive and sensitive to the specific entropy measure used. Regions that are more specialized experienced greater economic growth and there was little relationship between levels of diversity and unemployment. They suggest that part of the empirical shortfall may be due to factors, other than diversity, that influence stability, which tended to be ignored in empirical estimation.

In response to these concerns with the traditional measures of diversity, regional economists currently rely on other analytical tools that focus on specific industries or industry clusters, including location quotients, shift-share analysis, and I-O models.

3. RESEARCH METHODOLOGY

3.1 Research Design

The study employed both descriptive and analytical methods in its research design. The descriptive method used descriptive tools such as simple tables in analysing trends in macroeconomic policy dynamics and diversification in Nigeria. The analytical method used various econometric methods in estimating the relevant equations under the framework of multiple regression modelling. This includes the multiple regression analysis of the ordinary least squares methodology. However, the precise empirical model for estimation is the ARDL model.

This design was used to establish the fundamental relationship between the dependent variable and the independent variables.

The study tested for the unit root and co-integration relationship among the variables. The unit root was tested using the Augmented Dickey-Fuller (ADF). In estimating the long run equilibrium and s"hort run dynamics among the variables, the Error Correction Model (ECM) was employed.

3.2 Model Specification

To "examine the relationship between monetary policy and economic diversification in Nigeria between the period of 1982 and 2021, the study utilized the Herfindal index of diversification (DIVX) as well as the neoclassical growth theory. The choice of Herfindal index is based on the fact that it exhaustively analyses all the sectors in an economy in order to determine whether the economy provides a healthy competition or is veering close to being dominated by one or very few sectors of the economy.

The Herfindal index of diversification is:

$$\text{Herfindal Index} = \sum_{i=1}^{N} S_i^2 \qquad (9)$$

i = 1….N

Where, N is total number of categorized export commodities in the economy (excluding oil export) and Si is the export share of commodity i

in the total export basket (excluding oil export) of the economy in a given period. Si can therefore be represented as

$$Si = \left[\frac{xi}{x}\right] \tag{10}$$

Where:

xi = the share of commodity X in total export (excluding oil export) in a particular period
X = the total export in the same period.

A higher Herfindal Index value indicates a lower level of diversification (and a high level of concentration) in the economy. In other words, economic activities are concentrated on a few sectors of the economy. A lower value of Herfindal Index indicates a greater level of diversification in the economy. The Herfindal Index is expressed in percentage. The World Bank (2019) gave a modified version of the Herfinal index. It states that, Diversification index is computed by measuring absolute deviation of the country share from world structure. Diversification index that ranges from 0 to 1 reveals the extent of the differences between the structure of trade of the country or country group and the world average. The index value closer to 1 indicates a bigger difference from the world average. It is constructed as the inverse of a Herfindahl index.

Thus, the Herfindal index of diversification is modified as:

$$DIVX = 1- \sum_{i=1}^{N} S_i^2 \tag{11}$$

Where DIVX is Diversification index.

It must be emphasised that the whole essence of diversifying the economy is to stimulate economic growth and make the economy less vulnerable and more resilient to external shocks arising from dependence on one source of export revenue. Therefore, the theoretical foundation upon which this study is based is the neoclassical growth theory which emphasizes the role of labour and capital in the growth process. Since the neoclassical model is essentially of the same structural form with the Cobb-Douglas production function, our baseline neoclassical model is of the form:

$$Yt = At \, Kt\alpha \, Lt \, \beta \tag{12}$$

Where;

Y = Output
A = Total factor productivity or efficiency parameter
K = Stock of capital
L = Labour force
α = output elasticity of capital
β = output elasticity of labour

We endogenizing the Solo residual or total factor productivity in line with the postulations of the endogenous growth theory by augmenting the entire framework to incorporate other variables relevant to the present study. Specifically A is expanded to include a hybrid of other monetary (M) variables influencing economic diversification in Nigeria. Thus,

$$A = f(M) \tag{13}$$

Where M represent monetary policy variables. The Mundell-Fleming framework is further strengthened by the emergence of endogenous growth theories and models (e.g. Barro, [52], Romer, 1986;) which suggest that other endogenous factors like macroeconomic policies (inflation, interest rate, GDP, government spending and tax, trade policies etc.), political stability, market distortions, human capital and education, etc., can also affect economic diversification and growth. Renelt (1991) for example has attempted to integrate exogenous forces with endogenous factors in explaining economic diversification across countries. In this study, the augmented Solow neoclassical model is used.

Incorporating equation (13) into (12), transforms (12) into:

$$Yt = M, \, Kt\alpha \, Lt \, \beta \tag{14}$$

Equation 14 is the augmented version of the neoclassical model. However, since the study is not on economy-wide output, but on the effect of monetary policy on diversification in Nigeria, we modify equation 14 to include the diversification index as our dependent variable represented as:

$$DIVX = f(M, \, Kt\alpha \, Lt\beta) \tag{15}$$

It should be noted that

$$M = f(M2, \, REER) \tag{15.1}$$

Substituting the above sub-equations into equation 3.7 to account for the general macroeconomic policies we have:

$$DIVX = f(M2, REER,) \qquad (16)$$

Equation 16 says that Nigeria's diversification can be explained by the key monetary policy variables on the right hand side of the equation. The econometric specification of equation 16 is of the form:

$$DIVX = \lambda_0 + \lambda_1 M2 + \lambda_2 REER + \varepsilon t \qquad (17)$$

Presenting equation 17 in its log linear form:

$$DIVX = \lambda_0 + \lambda_1 \ln M2 + \lambda_2 REER + \varepsilon t \qquad (18)$$

$$\lambda_{2,} i < 0; \lambda_1$$

$$\varepsilon t = error\ term$$

To account for the specific objectives of the study, the monetary fiscal and trade policy variables are isolated from equation (18) into their respective models:

Recall that:

$$DIVX = f(M, Kt\alpha\ Lt\ \beta)$$

Where M represents monetary policy, the specific form of the functional relationship between monetary policy and diversification becomes:

$$DIVX = f(M2, REER, Kt\alpha\ Lt\ \beta) \qquad (19)$$

Equation 3.11 can be further expressed econometrically as:

$$DIVX = \beta_0 + \beta_1 M2 + \beta_2 REER + \beta_3 GFCF + \beta_4 LF + \varepsilon t \qquad (20)$$

Presenting equation 3.12 in its log linear form:

$$DIVX = \beta_0 + \beta_1 \ln M2 + \beta_2 REER + \beta_3 \ln GFCF + \beta_4 \ln LF + \varepsilon t \qquad (21)$$

$$\beta_1, \beta_3, \beta_4 > 0; \beta_2\ i < 0;$$

Where:

DIVX= Diversification index in percentage (%)
M2= Money supply measured in billions of naira
REER = Real Effective Exchange Rate measured in percentage (%)
GFCF = Gross Fixed Capital Formation measured in billion naira
LF = Labour Force

$\lambda_{,} \beta_{,}$ are the parameters to be estimated.

εt = error correction term

The Pesaran, Hashem and Smith (2001) Autoregressive Distributed Lag (ARDL) bounds method. Here, was used. Here we re-write the equation as an ARDL model which is as shown below in equation 3.21.

The post cointegration stability test such as the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) recursive residuals tests is applied.

$$\Delta(Y)t = a0 + \sum_{i=1} \alpha_i \Delta (a_1)_{t-1} + \sum_{i=1} \beta_i \Delta (a_2)_{t-1} + \sum_{i=1} \gamma_i \Delta (a_3)_{t-1} + \sum_{i=1} \theta_i \Delta (a_4)_{t-1} + \sum_{i=1} \omega_i \Delta(a_5)_{t-1} + \sum_{i=1} \lambda_i \Delta(a_6)_{t-1} + \ldots + \sum_{i=1} \varphi_i \Delta(a_n)_{t-1} + \varepsilon \qquad (22)$$

Where a1, a2, a3, a4, a5, a6,……an represents the variables, Δ represents the first differences while ε represents the error term.

$$(a0)t-1 + \beta1(a1)t-1 + \beta2(a2)t-1 + \beta3(a3)t-1 + \beta4(a4)t-1 + \beta5(a5)t-1 + \beta6(a6)t-1 + \ldots + \beta n(an)t-1 + \varepsilon t \qquad (23)$$

Specifying the ARDL model, the explicit form of the equations is given as:

$$\Delta DIVX_t = \beta_0 + \beta_1 DIVX_{t-1} + \beta_2 ln MS_{t-1} + \beta_3 REER_{t-1} + \beta_4 ln GCF_{t-1} + \beta_5 ln LF_{t-1} + \sum_{i=0}^{k} \lambda_1 \Delta DIVX_{t-1} + \sum_{i=0}^{k} \lambda_2 \Delta ln MS_{t-1} + \sum_{i=0}^{k} \lambda_3 \Delta REER_{t-1} + \sum_{i=0}^{k} \lambda_4 \Delta ln GCF_{t-1} + \sum_{i=0}^{k} \lambda_5 \Delta LF_{t-1} + U_t$$

$$(24)$$

3.4 Sources of Data

The relevant data for this study were obtained from secondary sources, mainly Central Bank of Nigeria (CBN) Statistical bulletin (Various years), National Bureau of Statistics (NBS) various years, The Federal Ministry of Finance (FMF), National Planning Commission (NPC), publications of the International Monetary Fund (IMF) and the World Bank (IBRD), and other relevant journals and publications. These are the recognized and reliable sources of published data that are valid for information.

4. RESULTS

4.1 Data Presentation

Table 1 presents the descriptive statistics on the monetary variables captured in this study. The main aim was to examine the underlying characteristics of the dataset used for empirical analysis. The descriptive statistics as depicted in Table 1 showed mean values for DIVX, GFCF, LF, MS, REER and TAX to be 0.64, 4010000000000.00, 39647683.00, 5502.74 and 141.31 respectively. The maximum values of the variables are 0.820898, 2.14E+13, 60698492, 24889.61, and 546.4000 for DIVX, GFCF, LF, MS, and REER respectively while their corresponding minimum values are 0.270922, 7.99E+09, 23651428, 17.69000, and 49.78000.

The analysis was also fortified by the values of the skewness and kurtosis of all the variables involved in the models. The skewness is a measure of the symmetry of the histogram while the kurtosis is a measure of the tail shape of the histogram. The bench mark for symmetrical distribution i.e. for the skewness is how close the variable is to zero. An analysis of skewedness of the distribution shows that GFCF, LF, MS, and REER, are all positively skewed while DIVX is negatively skewed.

4.2 Unit Root Test

The unit root test was conducted with the aim of establishing the stationarity conditions of the variables. The test was based on the Augmented Dickey-fuller (ADF) test as well as the Phillips-Perron test. The result of the stationary test below (Table 2) shows that all the variables except diversification index (DIVX), real effective exchange rate (REER) and labour force (LF)) were non-stationary at levels as none of them exhibited trend stationarity i.e. I (0). This is because both their ADF and PP statistic values are less than the critical table values at either 1 or 5 percent level of significance. Thus we could not accept the alternative hypothesis of stationarity, implying that the tests strongly support the hypothesis that all the variables are non-stationary, and that they are particularly of a random walk. Stationarity was achieved after the first differencing of the series. A non-stationary series manifest a random walk and therefore any dynamic specification of the model in the levels of series would be inappropriate and may lead to nonsensical or spurious regression and wrong inferences.

With first differencing of the series using the ADF, all the variables attained stationarity. The PP test also produced similar results. In all, stationarity was achieved for all variables at first difference. The existence of stationarity of the variables at first difference or the same order then provides a justification for co-integration test using the autoregressive distributed lag (ARDL) model variant of ordinary least squares regression technique.

Table 1. Descriptive statistics result

	DIVX	GFCF	LF	MS	REER	
Mean	0.641131	4.01E+12	39647683	5502.743	141.3114	
Median	0.692082	3.52E+11	38460722	1073.890	99.56000	
Maximum	0.820898	2.14E+13	60698492	24889.61	546.4000	
Minimum	0.270922	7.99E+09	23651428	17.69000	49.78000	
Std. Dev	0.145884	6.51E+12	10811298	7753.968	117.5712	
Skewness	-0.998220	1.464535	0.316705	1.253891	2.227868	
Kurtosis	3.085058	3.678886	1.974786	3.165512	7.215541	
Jarque-Bera	5.989514	13.56051	2.178409	9.474545	56.43655	
Probability	0.050049	0.001136	0.336484	0.008763	0.000000	
Sum"	23.08073	1.45E+14	1.43E+09	198098.7	5087.210	
Sum Sq.Dev.	0.744874	1.49E+27	4.09E+15	2.10E+09	483804.5	
Observations	38	38	38	38	38	

Source: "Author's computation using E-views10

Table 2. Unit root test result using Augmented Dickey-Fuller (ADF) and Phillips-Perron tests

Variables	ADF			Phillips-Perron		
	Level	1st Difference	Order of Integration	Level	1st Difference	Order of Integration
DIVX	-3.962863	-	I(0)	-3.962863	-	I(0)
MS	-0.101523	-4.034051	I(1)	1.269310	-4.916125	I(1)
REER	-5.718197	-	I(0)	-2.238741	-5.129558	I(1)
GFCF	0.506705	-5.725037	I(1)	0.852770	-5.739721	I(1)
LF	10.77889	-	I(0)	9.719026	-11.21455	I(1)

ADF test critical test values. Phillip-Peron test critical values
Level: 1st Difference: Level: 1st Difference:
At 5% = -3.544284. 5% = -3.548490 At 5% = -3.552973. 5% = -3.574244
10% = -3.204699. 10% = -3.207094 10% = -3.212361. 10% = -3.233456
Source: Author's computation using Eviews 10

4.3 Granger Causality Test

The granger causality test was done so as to determine the causal relationship and the nature of causality between monetary policy and economic diversification. The analysis for granger causality is used to test the hypothesis of prediction of future values of certain economic variables while introducing or incorporating past/previous lags of other economic variables in the model. Also, a time series known as X_t will be said to granger cause another time series variable Y_t if only the former contains important information that can affect or predict further values of the later. Therefore, in this framework, if the F-test of the lagged values included in the model is statistically significantly different from zero, it therefore means that there is causality, which is said to be either uni-directional or bi-directional. In addition, the possibility of causality according to Enders and Granger (1998) is more likely when there is cointegration among variables. The test was also carried out to investigate if there is any direction of causality between monetary policy and economic diversification in Nigeria. The result obtained as presented in Table 3 shows that there is unidirectional causality between monetary policy and economic diversification. Thus, the null hypothesis that monetary policy (M2, REER, and LF) do not granger cause diversification was rejected while the alternative hypothesis that diversification does not granger monetary policy was accepted. This implies that monetary policy granger cause economic diversification in Nigeria.

4.4 Co-integration Test

The results of the co-integration test based on the ARDL bounds testing approach is presented in Table 4. The outcome of the bounds test shows that the F-statistic value of 6.49 is greater than the upper bound critical value of 3.67 at five percent level of significance. Since it is established from the bounds testing procedure that the calculated F-statistic value has exceeded the upper critical bound value at five percent significance level, the study therefore rejected the hypothesis which says that there is no co-integration and hence, no long-run association among the variables captured in the monetary policy equation. Thus, the alternative hypothesis that there exists a long run co-integrating relationship among the variables of the study is accepted. Based on this result, the study concludes that the variables are co-integrated and hence, there is a long run relationship among them.

Table 3. Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
M2 does not Granger Cause DIVX	38	3.01990	0.0232
DIVX does not Granger Cause M2		1.20356	0.3147
REER does not Granger Cause DIVX	38	5.44988	0.0021
DIVX does not Granger Cause REER		1.93594	0.1625
GFCF does not Granger Cause DIVX	38	3.86855	0.0302
DIVX does not Granger Cause GFCF		0.74910	0.4817
LF does not Granger Cause DIVX	38	4.21712	0.0247
DIVX does not Granger Cause LF		1.34839	0.1755

Source: author's computation using E-views 10

Table 4. ARDL bounds test for co-integration

Test Statistic		Value	K
F-statistic		6.493966	2
Critical Value Bounds:		I0 Bound	I1 Bound
Significance level:			
	10%	2.37	3.20
	5%	2.79	3.67
Decision: There is co-integration			

Source: Author's computation using Eviews 10

4.5 ARDL Long Run Estimates

Since it was established in the preceding section that there exists co-integration and hence long run equilibrium relationship among the variables in the monetary policy equation, the study proceeded to estimate the long run equation for the model. The result of the long run ARDL estimate is presented in Table 5.

The result shows that the coefficient of money supply (M2) is 0.218. It thus has a long run positive relationship with economic diversification. It follows therefore that a one percent increase in M2 will lead to a 0.218 percent increase in diversification in the long run. This result is consistent with apriori expectation. With a p-value of 0.106, the variable is not statistically significant since its p-value is more than 0.05.

The coefficient of real effective exchange rate (REER) is -0.142. This shows a long run negative relationship with economic diversification, consistent with apriori expectation. A one percent increase in REER will lead to a decrease of 0.142 percent in diversification in the long run. With a p-value of 0.033, the variable is statistically significant since its p-value is less than 0.05.

4.6 Short Run ARDL Estimates

The parsimonious error correction results of the monetary policy model based on the Autoregressive distributed lag (ARDL) approach is presented in Table 6. The result of the short-run dynamics showed that the error correction variable is fractional, has the expected negative coefficient and is statistically significant in line with theoretical expectation as its p-value is 0.000. Its coefficient of -0.984 indicates that 98 percent of the systemic disequilibrium in monetary policy variables was corrected each year. This represents a fast speed of adjustment from short run disequilibrium to long run equilibrium.

The value of R-squared is 0.57 and that of the adjusted R-squared is 0.53. The adjusted R-squared shows a fairly good fit on the data. It specifically implies that about 53 percent of total variation in the dependent variable (DIVX) was accounted for by variations in the independent variables (money supply, real effective exchange rate, gross fixed capital formation and labour force). This implies that the estimated model has a fairly good explanatory power.

The Durbin-Watson test statistic is 2.090. This is approximately 2 and this shows that the residuals are not correlated. Therefore, there is no serial correlation. The estimated model is thus well specified and well-behaved.

Evaluation of the short run coefficients shows that money supply (M2) has a positive relationship with economic diversification. With a coefficient of 0.02, this is consistent with theoretical apriori expectation as it demonstrates that a one percent increase in money supply will attract a 0.02 percent rise in diversification, ceteris paribus. The variable is however not statistically significant at its probability value is 0.993 which is greater than 0.05.

Table 5. ARDL long-run estimation

Variable	Coefficient	Std. Error	T-statistic	Prob.
LOG(M2)	0.218066	0.129369	1.685614	0.1060
REER	-0.141737	0.078103	-1.814748	0.0332
C	-49.367570	20.467981	2.411941	0.0247

Source: Author's computation using Eviews 10

The result also showed that the first lag of money supply has a positive relationship with economic diversification in Nigeria. This is again consistent with apriori expectations as its coefficient is 1.055. This implies that a one percent increase in the first lag of money supply will lead to a rise of 1.055 percent in diversification in the present period, ceteris paribus. Statistical test conducted on the variable shows that first lag of money supply is significant in influencing diversification as its p-value of 0.0012 is lower than 0.05.

Real effective exchange rate (REER) has a negative relationship with economic diversification. This is in line with theoretical postulation as its coefficient of -0.044 shows that a one percent increase in REER will lead to a fall in diversification by 0.04 percent, ceteris paribus. REER however is not statistically significant as its p-value of 0.545 is higher than 0.05. The first lag of REER however shows greater significance. It has a negative relationship with economic diversification as expected, apriori. Given its coefficient of -0.138, it shows that a one percent rise in one period lag of REER will attract a 0.138 percent fall in diversification in Nigeria ceteris paribus. REER is however, not statistically significant as its p-value of 0.080 is higher than 0.05.

Further evaluation of the results shows that gross fixed capital formation (GFCF) plays a positive role in influencing diversification in Nigeria given the value of its coefficient in the current period. The coefficient is 0.192. This result is consistent with theoretical expectations indicating that a one percent rise in GFCF in the curren"t period will lead to a 0.192 percent increase in diversification. GCFC is also statistically significant in influencing diversification. This is shown by its p-value of 0.0001 which is lower than 0.05.

Labour force (LF) also "showed a positive relationship with the dependent variable, diversification. This, in real terms, means that a one percent rise in labour force attracts 2.27 percent increase in diversification and this is consistent with apriori expectation. The p-value of LF is 0.000 which is statistically significant as it is lower than 0.05.

4.7 Diagnostic Test

4.7.1 Heteroscedasticity Test, LM Test and Q Test

To ascertain the adequacy of the estimated equation, several diagnostic tests were conducted. Normality tests such as the Breusch-Godfrey serial correlation Lagrange Multiplier (LM) test, and the Q-statistics were employed to check the existence of the normality or adequacy of the estimated model.

Table 6. Error correction result

Dependent Variable: D(DIVX)				
Method: ARDL				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**T-statistic**	**Prob.**
DLOG(M2)	0.023975	0.259109	0.092528	0.9271
DLOG(M2(-1))	1.054929	0.283466	3.721532	0.0012
DLOG(M2(-2))	0.427999	0.305393	1.401471	0.1750
D(REER)	-0.044377	0.072207	-0.614573	0.5451
D(REER(-1))	-0.138382	0.075501	-1.832851	0.0804
LOG(GFCF)	0.192203	0.039625	4.850560	0.0001
LOG(LF)	2.273792	0.440937	5.156725	0.0000
CointEq(-1)	-0.984386	0.190705	-5.161816	0.0000
R-squared	0.566462	Durbin Watson stat	2.090282	
Adjusted R-squared	0.525071	F-statistic	6.493966	
Prob. (F-statistic)	0.0002			

Source: Author's computation using E-views 10.

The results of the tests are summarized in Table 7. The Breusch-Godfrey serial LM test statistic of 0.786629 with its high probability value of 0.4690 showed that there is no problem of autocorrelation in the model. This is confirmed by the fact that the Chi-square probability value of 0.300 is higher than the 5 percent significance level. This indicates that the residuals terms are independent and hence there is no autocorrelation in the estimated equation. Meanwhile, the Breusch-Pagan-Godfrey heteroskedasticity test statistic of 1.573990 with its probability value of 0.1757 showed that the residuals have constant variance and hence there is no problem of heteroskedasticity in the model. This is confirmed by the fact that the probability value of the observed Chi-squared is 0.1837 which is greater than the 5 percent significance level.

Similarly, the Q-statistics as shown in Table 8 showed that the series is white noise, and hence there is no auto-correlation among the residual terms in the model as the probability values are all higher than 5 percent significance level. This also means that the value of the residual in one particular period was independent or unrelated to the value of the residual terms in another period. That also implied that the co-variation between the residuals was zero. The conclusion from the various test conducted showed that the estimated equation is adequate and well-behaved.

4.8 Stability Test

The Cumulative Sum (CUMSUM) and Cumulative Sum of Squares (CUMSUMSQ) tests were applied in order to examine the stability of the parameter after the ECM models were estimated. Fig.1a and 1b show that both the CUMSUM and CUMSUMSQ statistics fall within the critical bounds of ± five percent level of significance. This plots indicate that the coefficients of the results being estimated are stable in the long run and that there exists a long-run relationship between monetary policies and economic diversification in Nigeria. This therefore implies that the coefficients are changing gradually.

Table 7. Diagnostic test

Test Statistic Value (prob.)			
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.786629.	Prob. F (2,20)	0.4690
Obs. R-squared	2.406568	Prob. Chi-Square(2)	0.3002
Breusch-Pagan-Godfrey Heteroskedasticity Test			
F-statistic	1.573990	Prob. F(11,22)	0.1757
Obs. R-squared	14.97365	Prob. Chi-Square(11)	0.1837

Source: Author's computation using E-views 10.

Table 8. Q-statistic test for monetary equation

	AC	PAC	Q-Stat	Prob*
1	-0.057	-0.057	0.1189	0.730
2	-0.169	-0.173	1.1881	0.552
3	0.062	0.042	1.3351	0.721
4	-0.018	-0.043	1.3486	0.853
5	-0.079	-0.068	1.6072	0.900
6	0.064	0.044	1.7803	0.939
7	-0.187	-0.211	3.3304	0.853
8	-0.112	-0.119	3.9064	0.865
9	0.109	0.019	4.4786	0.877
10	-0.099	-0.135	4.9749	0.893
11	-0.061	-0.056	5.1681	0.923
12	-0.008	-0.114	5.1713	0.952
13	-0.016	-0.052	5.1852	0.971
14	0.055	0.004	5.3719	0.980
15	-0.113	-0.227	6.1842	0.976
16	-0.089	-0.126	6.7202	0.978

Source: Author's computation using E-views 10
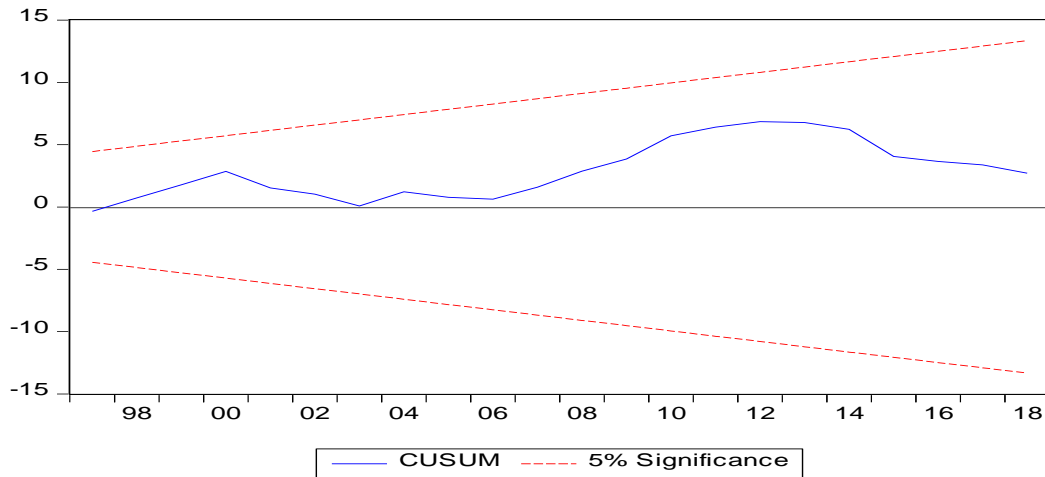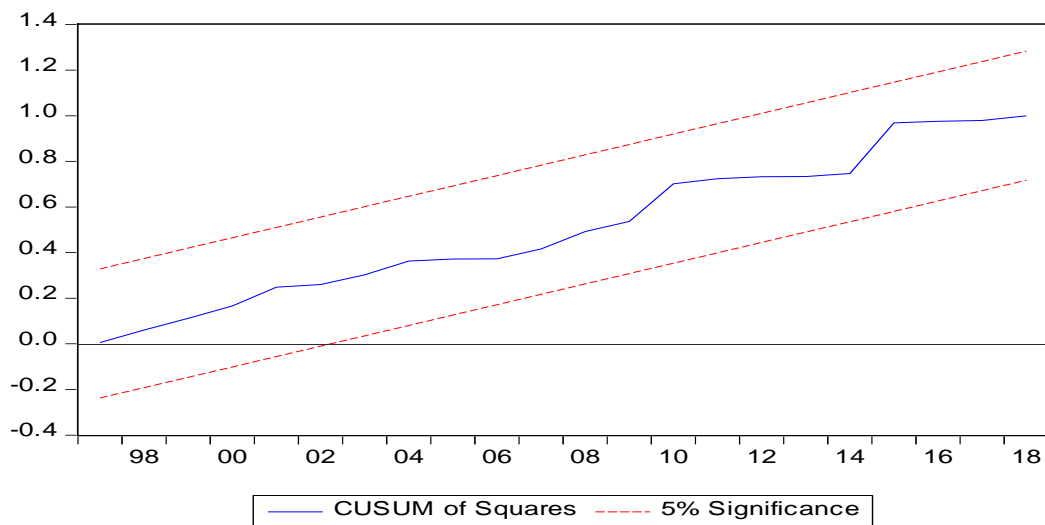
Fig. 1a. CUSUM

Fig. 1b. CUSUM Square
Source: Author's computation using E-views 10.

5. DISCUSSION

From the analysis of the result of this study, it can be seen that monetary policy have positive and significant impact on economic diversification in Nigeria. The long run result for monetary policies showed for instance, that money supply has a positive impact on economic diversification in Nigeria. This is because, an increase in money supply reduces market interest rate resulting in an increase in planned investment and a consequent increase in aggregate demand and by extension, encourage diversification in the country [53,54]. Of course, this is based on the assumption that investment is sensitive to interest rate which is in turn, sensitive to money supply. This means that the various measures which the monetary authorities

put in place to increase the supply of money yielded positive but not significant influence on diversification in Nigeria within the period of study. The positive impact of money supply is consistent with the study carried out by Omoke and Ugwuanyi (2010) which revealed that there is a positive relationship between money supply and output. This also corroborates the earlier work of Nwaobi (1999) which examined the interaction between money and output in Nigeria between periods 1960-1995. The result indicated that unanticipated growth in money supply would have positive effect on diversification.

The result also shows that real effective exchange rate is negative and significant and affects diversification inversely. Consistent with apriori expectation, the negative estimate is

expected because, an increase (appreciation) in exchange rate encourages a rise in imports and a fall in exports since imports becomes cheaper than exports. This implies that exchange rate depreciation could be good for diversification especially in the long run. This result is consistent with the study carried out by Ayodele [55], who examined the impact of exchange rate on the Nigeria economy. The author stated that exchange rate has a negative impact because as it increases, economic growth is inversely affected. This result was also in line with the study carried out by Obi and Oniore (2016) and Lawal, Atunde, Ahmed and Abiola [56] who found out that exchange rate has no effect on economic growth in the long run though a short run relationship exists between the two.

6. CONCLUSION AND POLICY RECOMMENDATIONS

The thrust of the study was to utilize empirical methods in investigating the impact of monetary policy on economic diversification in Nigeria. In particular, the study examined impact of monetary policy on economic diversification in Nigeria. To achieve the above objective, empirical techniques based on bounds testing procedure was adopted within the frame work of autoregressive distributed lag (ARDL) modelling, the specified equations were estimated. The Standard International Trade Classification (SITC) format was used in classifying trade activities into export categories. This afforded the researcher the unique advantage of computing detailed breakdown of sectoral export components (except petroleum sector exports) into the diversification index. Though there have been several studies on the effects of monetary policy on economic diversification, very few, if any, have had to examine these effects on specific sectors and sub-sectors as was done in this study.

The study applied the augmented Dickey-fuller (ADF) test, the Phillip-Peron test, Autoregressive Distributed Lag (ARDL) bounds approach, Granger Causality test and the Error Correction Model (ECM) regression analysis technique. A time series data that spanned a period of forty years, from 1982 to 2021 was utilized. and the following summary of findings are presented below:

The error correction model is correctly signed for all the equations and statistically significant. The granger causality test shows that there is a causal relationship between macroeconomic policy variables and economic diversification. The long-run results showed that monetary policies have significant effects on economic diversification as reflected by the impact of such variables as money supply and real effective exchange rate. The result showed that an increase in money supply impacts positively on investment which helps to expand and diversify the economy. The results also showed that real effective exchange rate has an inverse relationship with diversification. While a devaluation of the currency will stimulate growth and diversification, the result established that currency appreciation will also discourage exports and diversification. In addition, concentration on a narrow basket of primary products for exports and the importation of a wide range of products and services has also negatively impacted on diversification.

The result from the parsimonious estimation of the monetary policy variables shows that monetary policy exerts positive and significant influence on economic diversification in Nigeria. Money supply for instance, has a direct effect on diversification this is possibly because an increase in money supply raises demand and the market inducing expansion in existing products and stimulating the demand for new products and services. Devaluation of the domestic currency also attract similar effects as it encourages exports and discourage imports.

Based on the findings of the study, the following recommendations are made to boost the economic diversification and growth of the Nigerian economy.

The positive and significant impact of monetary policies on economic diversification should be sustained. Specifically, the exchange rate policies aimed at preserving the value of the domestic currency, maintaining a favourable external reserves position and ensuring external balance should be pursued by the monetary"y authorities. A realistic exchange rate has the advantage of discouraging import and encouraging exports and diversification.

Monetary authorities are also encouraged to increase money supply as this has similar benefit of increasing private consumption. It decreases interest rate and therefore encourages lending and investment and by extension, increase in output, diversification and growth of the economy. Monetary authorities must however be

wary of the tendency of an increase in money supply to lead primarily to inflation. Monetary authorities must ensure viable productive potentials in the economy to respond positively to the rise in money supply.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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