
The Antioxidant Activity And The Total Polyphenol Content Of The Solvent Extracts Of Rhizomes Of Curcuma Mangga Valetou And Zigp From The Congo Cataracts Plateau.

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Abstract

Curcuma mangga Val is a zingiberaceae whose leaves are used as aromas and rhizomes to relieve various ailments. This use suggests an impact on the biological action of the different organs of this plant. The samples collected at four different sites are dried and then ground. The determination of total polyphenols is carried out with the Folin-Ciocalteu reagent and the antioxidant activity with the reducing agent DPPH. The amount of total polyphenols is greater by methanol compared to the two other solvents used: ethyl acetate and chloroform. Methanol extracts have good antioxidant activity with an IC50 of 415.18 µg / ml compared to vitamin C of 296.42 µg / ml. There is a positive correlation between the content of total polyphenols and the anti-radical activity.

Keywords: Correlation, antioxidant activity, polyphenol and Curcuma mangga.

Introduction

Free radicals are the basis of many diseases in the human body. Antioxidant activity defines the ability of a chemical compound to protect an organism from free radicals. Most of the antioxidants used are of synthetic origin, which leads man to seek, in his natural environment, a means of protection without drawbacks. In many foods drawn from the Congolese flora, there are a large number of phenolic molecules which can be used as alternative sources of synthetic compounds in the fight against several cardiovascular and inflammatory diseases but also against Cancer. Among these plants rich in phenolic compounds we have a range of pharmacological plants recognized in the Republic of Congo, including plants of the zingiberaceae family. The zingiberaceae family includes a large number of species, most of which are used as spices in food. In this family, we have the genus Turmeric which counts between (40) to (110) species, originally answered in tropical regions: Asia, Africa and Northern Australia; seasonal precipitation.

Curcuma mangga Valetton and Zigp is an embryo, spermaphytes, phylum, angiosperms, Class, monocotsmonoaperturées and monocotylées; of the Subclass: advanced or commelinideae, of the Order of zingiberal, of the Tribe of zingibéracéae; the Tribe: hedychieae, of the Genus Curcuma. Some work carried out on the rhizomes of Curcuma manga Val. We have revealed a pharmacological activity of this plant on cancer cells [1]. Similarly, plants such as Curcuma mangga; Curcuma amada, Curcuma caesu, Curcuma langa, Curcuma purpurusus, Curcuma xanthorrhiza and Curcuma zodouria, inhibit the proliferation of cancer cells. In this work, we will limit ourselves to the study of the content of total polyphenols in the solvent extracts of the rhizomes of Curcuma mangga Val. From Congo and to the evaluation of the antioxidant activity in order to establish a correlation.

Materials and methods

Material: Plant material

The rhizomes of Curcuma mangga Val were harvested in the Republic of Congo, in four (04) different localities, notably Brazzaville, Loukoko, Mindouli and Loulombo (figure 1). They are dried out of the sun, under laboratory conditions, for one week. These rhizomes were ground using a ProBlend 6 type mixer, then the powder obtained was used for various tests.

Methods

Preparation of extracts

50 g of powder of Rhizomes of Curcuma manga Val are immersed in 500 ml of methanol and left under stirring for 72 hours. The maceration obtained is filtered, then the filtrate is evaporated or concentrated using a rotary pyre-type evaporator.

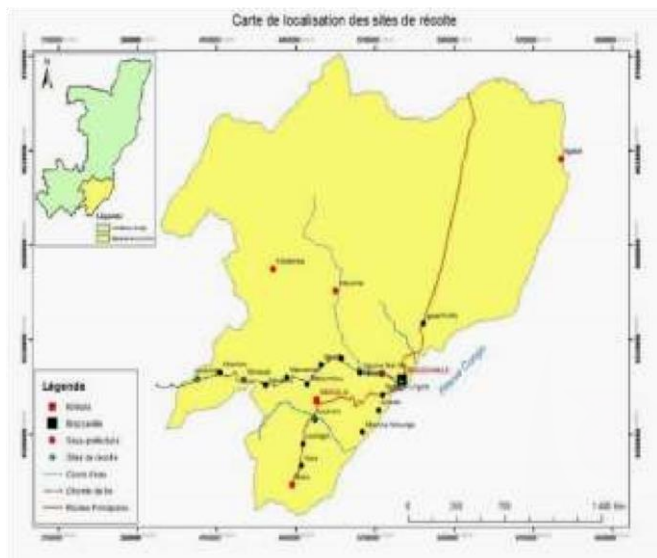


Figure 1: location map of sample collection sites

Total polyphenol content

We weigh 0.1g of the dry extract of Rhizomes from the powder of *Curcuma mangga* val. diluted in 100 mL of distilled water. A standard range is produced in an aqueous medium with 20 points of concentration from 0 to 34 $\mu\text{g} / \text{ml}$ with a reference polyphenol which is gallic acid.

To carry out the assay, 1500 μl of FolinCiocalteu reagent at 2M, diluted 10 times in distilled water, or add 300 μL of diluted extract to the point of range. Then 1200 μL of sodium decarbonate (7.5 g / L) is added. The reaction mixtures are left to incubate for 1 hour after being homogenized. The reaction blank does not contain the extract, it is considered to be the 0 $\mu\text{g} / \text{mL}$ point of the range. The abundances are read at 735nm using a UV-Visible spectrophotometer. A calibration curve is plotted against each concentration for the points in the range. The average concentration of polyphenols present in the plant extract is determined in μg equivalent of gallic acid / mL.

Anti radical activity

The method used is the trapping of the stable free radical DPPH. The purple DPPH solution has a maximum absorption at 517nm. The antioxidant power of the methanol extract is evaluated by comparison with a reference antioxidant, vitamin C (ascorbic acid). However, three measurements are made respectively at the extract concentrations used. For this, the solutions of the extracts are prepared in a following concentration range 400, 600, 800, 1000, 1200, 1400 $\mu\text{g} / \text{ml}$ of methanol. A stock solution of DPPH of 0.004% concentration is prepared.

The absorption is read for each concentration for 60 min at an interval of 5 min. The antioxidant activity (AA%) is calculated according to the following formula:

Results and discussions

Gallic acid calibration curve

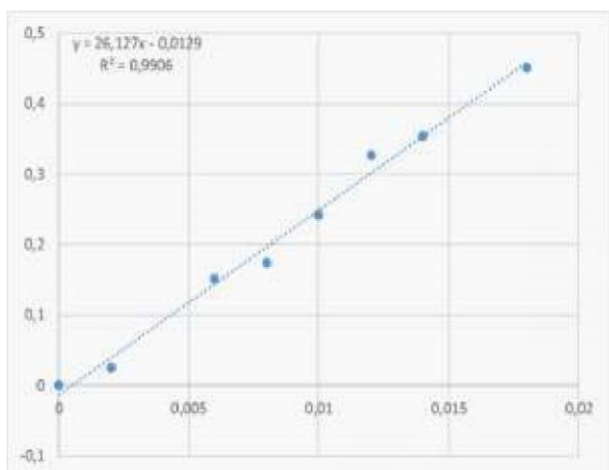


Figure 2: Gallic acid calibration curve.

We measured the total polyphenol content of the extracts. Estimated in mg equivalent of gallic acid per gram of dry matter. It is obtained by the calibration curve established with the concentrations. The calibration curve which is a linear straight line of the form $Y = aX + b$ makes it possible to determine the quantity of total polyphenols. The polyphenol content is unknown from our relationship, which is determined by reference to folin-ciocalteu. The content of total polyphenols differs from plant to plant, the nature of the extract and the part of the plant. Three types of extract were dosed: extract with methanols, ethyl acetate and chloroform. Each measurement is performed three times. Figure 2: From the curve, we see that the regression coefficient $R^2 = 0.9906$ close to 1. We can therefore use it for the determination of the total polyphenol content of our extracts of total polyphenols has been shown depending on the extraction solvent. For this, methanol gives extracts more concentrated in total polyphenols in the rhizomes of *Curcuma mangga* Val. (Figure 3).

Amount of total polyphenols extract:

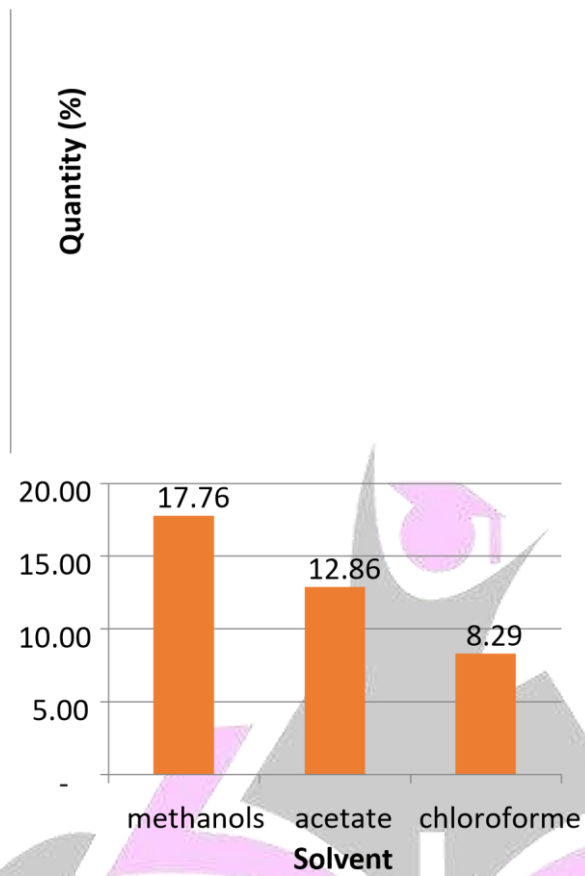


Figure 3: quantity of total polyphenols by

The methanol extracts have a high content which is much higher than the others. The amount in the chloroform extract is just a few traces. It is twelve times larger than that of ethyl acetate. However, the content of the ethyl acetate extract is about three times that of the chloroform extract (Figure 3). The polyphenol content of the methanol extracts is 46.66 ± 3.37 mg equivalent of gallic acid / gram of dry

matter, that of the ethyl acetate extracts is 4.01 ± 0.97 mg equivalent of gallic acid / gram of dry matter and that of the chloroform extract represents practically the traces 1.86 ± 0.21 mg equivalent of gallic acid / gram of dry matter. In fact, the difference in polarities between the solvents allows better extraction of the polyphenols. The kinetic curves of methanol are in practically the same as that of vitamin C. (Figure 5).

Inhibition of extracts with solvents.

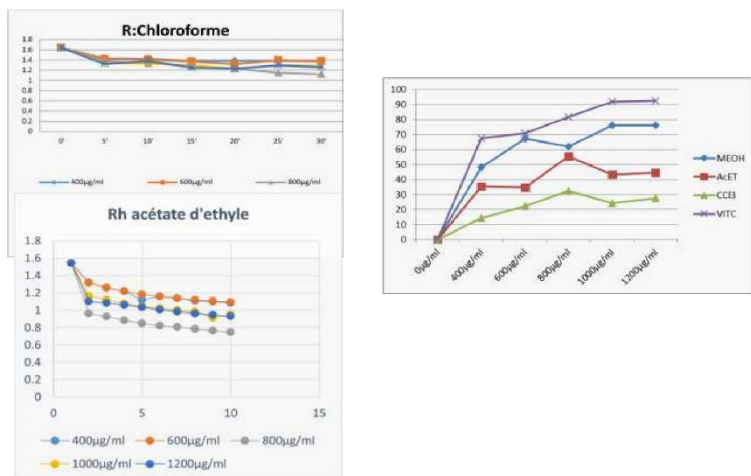


Figure 5: inhibition curves.

The inhibition curves of the extracts give the appearance according to their activities. For this purpose, this is compared with vitamin C which is the reference that the curve of the methanolic extract is comparable of ascorbic acid. This is followed by the curve of the acetate extracts. The results show that the antioxidant activity of the extracts varies with the extraction so comparing the inhibition of each extract, we find that the inhibition of the methanol and ethyl acetate extracts is clearly above the inhibition of the chloroform extract. The activity is linked to the family of total polyphenols which shows the absence of *DPPH*.

The chloroform, ethyl acetate and methanol extracts show kinetic curves which give the amount of DPPH reduction. The chloroform extract gives a kinetics little differentiated by the curves. The curves have three parts. The first is from zero to two minutes. This part is characterized by a partial decreasing. The second is from two (2) to six (6) minutes, it decreases sharply and the last one, which is characterized by a stage until the end. Which shows the end of the reaction. For each concentration, the kinetics do not make a big difference. However, at the highest concentrations after $800 \mu\text{g} / \text{ml}$, we have great kinetics. At concentrations below $800 \mu\text{g} / \text{ml}$, all the curves give a level of 2 at the end. The of activity. The curves are

confusing, The ethyl acetate extract, the kinetic curve shows two parts. It decreases from zero to two (2) minutes. Two (2) minutes, at the end of the reaction, we have a plateau. The extract activity with this solvent is proportional to the concentration. It is also a function of time. (Figure 4).

Comparing the benchmark kinetics of vitamin C to that of ethyl acetate extract, there is a small activity but less important compared to ascorbic acid. But the kinetic curves show a small activity by the presence of two phases: The active phase and the end of reaction phase. Like other kinetics, that of the methanol extract has two parts. The first is that which decreases from zero to five (5) minutes. During this period, there is a reaction in the environment. The second gives a five minute timeframe until the end. Which shows the end of the reaction. The activity of this extract is proportional to the concentration. Each concentration the extract. The inhibition percentages are for the three extracts respectively 76.12%; 55.43%; 32.57% and 91.80% for vitamin c.

IC50 diagram.

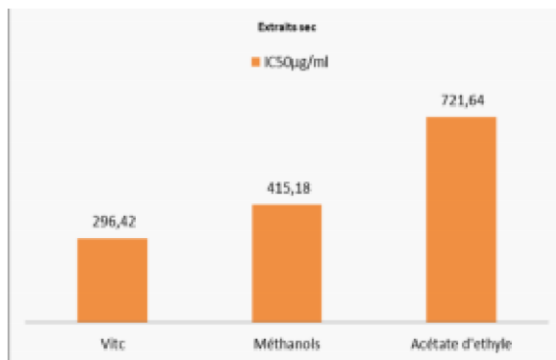
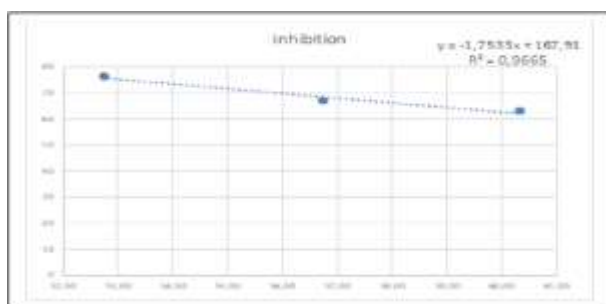


Figure 6 : IC50 value of extracts with solvents

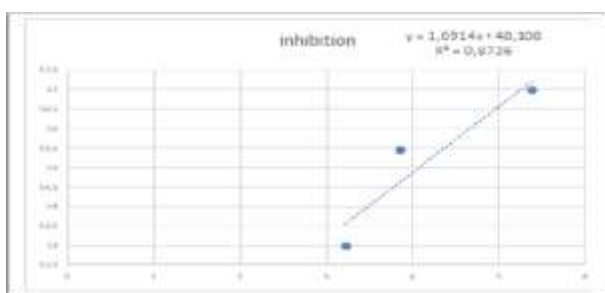
The methanol extract has an IC50 of

415.178 $\mu\text{g} / \text{ml}$ and the ethyl acetate extract has an IC_{50} of 721.64 $\mu\text{g} / \text{ml}$ and the ascorbic acid has an IC_{50} of 296.42 $\mu\text{g} / \text{ml}$. The work of Wahyu Widowati et al. [5 and 6] shows that the extract of Turmeric mangga Val. had an IC_{50} of 277.79 $\mu\text{g} / \text{ml}$. This activity was more important than that of ascorbic acid (296.42 $\mu\text{g} / \text{ml}$). However, the chloroform extract gives no IC_{50} value. These results show that ascorbic acid remains the most effective antioxidant than those of the methanol extracts of the rhizomes of *Curcuma mangga* Val., Followed by those of the ethyl acetate extracts. (Figure 6). This parameter is defined as the antioxidant concentration required to decrease the initial concentration by 50 %, it is inversely related to the antioxidant capacity.

Correlation between antioxidant activity and total polyphenol content of the extracts



(a): Methanol extract



(b): Ethyl acetate extract

Figure 7: Correlation between the level of total polyphenols and antioxidant activity.

A very important positive correlation is observed between the antioxidant activity and the total polyphenol content of the methanol extracts. This correlation is shown by the correlation coefficient between the polyphenol content in the extract and the percentage of inhibition. The correlation coefficient is $R^2 = 0.97$ (Figure a). This correlation shows that the trapping of the free radical is due to the presence of total polyphenols in large quantities in these extracts. For ethyl acetate extracts, the correlation coefficient is R^2

= 0.87, the content of total polyphenols and the antioxidant power are less effective. This correlation shows that the amount of total polyphenols is less than in the methanol extract. These results show that, the methanol and ethyl acetate extracts of the *Curcuma manga* Valeton and *Zigp* rhizomes contain a good amount of total polyphenols, which allows these extracts to have significant antioxidant activity. Polyphenols are recognized as antioxidants. The weak antioxidant activity found in the chloroform extract shows that the amount of total polyphenols is low. The best solvent for extracting total polyphenols from the *Curcuma manga* Valeton and *Zigp* rhizomes is methanol, followed by ethyl acetate. The correlation coefficients found in the three cases show the correlation that exists between the amount of total polyphenols and the activity.

Conclusion

These results give a trend in the total polyphenol content of the extracts in different extraction solvents. The two extracts, ethyl acetate and methanol, contain polyphenols respectively 4.01 mgeq of gallic acid per gram of dry matter and 46.66 mg eq of gallic acid per gram of dry matter. Methanol is the best solvent for the determination of polyphenols. The methanol extract gives good antioxidant activity. The IC₅₀ value is 415.17 µg / ml and that of ethyl acetate extract is 731.64 µg / ml. The antioxidant activity is improved in the methanol extracts. There is a positive correlation between the quantity of polyphenols and the antioxidant activity of the extracts. The correlation coefficient is $R^2 = 0.966$ around 1 for the methanol extract and $R^2 = 0.872$ for the ethyl acetate extract.

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FISCAL POLICY AND ECONOMIC GROWTH IN NIGERIA (1986-2019)

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Abstract

This study examined the relationship between fiscal policy and economic growth in Nigeria for the period 1986 to 2019. Essentially, the study examined the extent of relationship between some indicators of fiscal policy such as Government expenditures, Taxes, Overall fiscal balance and Economic growth. This study was undertaken because despite the various fiscal policy measures embarked upon by the federal government of Nigeria over the years of this study, the economy is yet to attain an acceptable level of economic stability. The study relied on secondary data obtained from the Central Bank of Nigeria statistical bulletin for various years. Regression analysis based on the classical linear regression model known as Ordinary least Square (OLs) technique was used to test the hypotheses. The model was analyzed using econometric and statistical criteria, unit-root test and co-integration test was also carried out. The results shows that Government Expenditure and Government Tax Receipt are positively related to the Real Gross Domestic Products which was used to capture economic growth while there is a negative relationship between the Overall Fiscal Balance and the Real Gross Domestic Product. In conclusion, we say that the use of Government expenditure, Government tax and deficits can lead to economic growth if used productively. We recommend that governments should ensure that the revenues generated from tax are channeled towards building capital stocks to create more jobs and generate more revenue to the government and also government should moderate the financing of deficits through borrowings which leads to debt crises, high interest rates in the domestic economy and worsening rate of unemployment in Nigeria.

Keywords- Fiscal policy, Economic Growth, Real GDP, Government Expenditure,
Government Tax Revenue, Fiscal Balance

Introduction

The macro-economic goals of every economy, whether developed or developing, include; increase in employment opportunities, price stability, and promotion of economic growth and development, equity in income redistribution, favorable balance of payments, stable exchange rate and prices, and increase rate

of investment. Economic growth can be defined as a consistent rise in the gross domestic or national product of a country over a period of time. Any rise in the productivity of goods and services in a country marks the increase in the country's economic growth.

One of the regulatory policies used by government in achieving its economic objectives is fiscal policy. According to (Adigwe 2005), Fiscal policy is concerned with deliberate actions which the government of a country takes in the area of spending money and for levying taxes. The reason for establishing fiscal policy is to influence the macro-economic variables such as the level of national income or outputs, the employment level, aggregate demand level and the general level of prices. Okoro (2014), said that fiscal policy deals with government deliberate actions in spending money and levying taxes with a view to influencing macroeconomic variables in a desired direction, with the aim of achieving sustainable economic growth, high employment creation and low inflation. Some of the tools of fiscal policy used by governments to influence growth and development are public spending, taxation and deficit budgets, government can manipulate any of these variables in order to achieve a certain level of economic objectives which would favor the general citizens.

From historical perspective, Nigeria discovered oil in 1956 but began to export oil in 1958. Since early 1970s oil became the dominant factor in the economy. The oil boom of 1970s led to a remarkable increase in the foreign exchange earnings in Nigeria, the era was also responsible for the emergence of disorderliness in Nigeria (Onuoha and Elegbede, 2018)

According to (Uzoaga, 1981),

Fiscal policy measures during the period 1967-1969 were similar in their objectives; they were designed primarily to raise sufficient funds to finance the civil war. In order to raise the funds required to finance the war, the government resorted to deficit financing. From 1970-1979 the economy was characterized by mounting inflation, a deteriorating balance of payments condition and a rapid rate of deficit financing. To reconstruct the economy, policy measures were designed to stabilize the domestic price level. The government introduced the price control board and the wages and salaries Review commission, import liberalization measures, reversal of the tax burden of the non-oil sectors of the economy. The price control scheme was later reviewed in order to stimulate and increase domestic production and reduce illegal trading between 1980 and 1985. Structural Adjustment Programme (SAP) was introduced in 1986 following the crash in the international oil market and the deteriorating economic condition of the country, it was designed to alter and restructure the production and consumption pattern of the economy to achieve fiscal balance and favourable balance of payments.

In the Central Bank of Nigeria conduct of fiscal policy various years, (CBN 2017)

1990 was the first year of the National Rolling Plan, the fiscal policy aimed at consolidating and sustaining National development with greater emphasis on reduction of inflationary pressures, streamlining of government revenue/expenditure imbalances, controlling of excessive monetary expansion, moderation of exchange rate fluctuations and implementation of all other existing measures designed to boost non-oil revenue. 1993 and 1994 focused on addressing the slow performance of the productive sectors, enhancing private sector involvement in production activities, depreciation of the naira, solving unemployment and external debt problems to restore fiscal discipline and economic stability, improve financial stability and accountability and stimulate growth in the productive sectors. 1997 and 1998, the policy thrust of these years was to achieve sustainable output growth and address the problems of unemployment and poverty in the country, fiscal measures adopted to encourage productive activities in the private sectors includes, minimization of the adverse effect of multiple taxation, low tax regime to stimulate consumption demand, tax reliefs and tax clearance waiver. The objective of fiscal policy from year 2000 to 2004 centered on fostering growth on the real sectors of the economy, reduce unemployment and inflation rate, improve education and agricultural production, the fiscal policy measures includes low tax regime, tax incentives and reliefs, the budgets aimed to

simplify the multiply tax and levies faced by companies and lower the company and personal income tax rates and bring Nigeria's tariffs in line with ECOWAS regional initiatives. The fiscal policy of 2002 budget was derived from the macroeconomic framework of the 2001-2003 Rolling Plan which aimed to maintain fiscal and monetary policy, liberalization and privatization of government investment. 2003 budget sought to improve non-oil sector competitiveness, deepen and broaden fiscal incentives to further encourage industrial and manufacturing sector, attract foreign investments, highlight tariff reforms and liberalization and also focus on external debt management to reduce debt level and debt service costs. 2004 was designed to support the reform programs, focus on job creation and employment generation for the youths. The reform programs were on the areas privatization, liberalization and private sector development. These goals were to be achieved through the diversification of the productive base of the economy. The 2005-2007 budget focused on diversifying and strengthening the economy in order to improve the wellbeing of Nigerians. They aimed to build physical and social infrastructures necessary for job creation and maintenance of fiscal discipline. The 2006 budget was a continuation of the NEEDs Reform Agenda which started in 2004. 2007 focused on the theme "To Accelerate Investment in Basic Physical and Human Resource Capital" thus, government expenditure was to be channeled towards completing on-going projects in the major sectors of the economy to generate employment and improve the quality of life of Nigerians. The 2009-2011 Medium Term Expenditure Framework consists of a 7point Agenda mapped out to set the guidelines for allocation of resources. Spending was focused on Transport sector, sufficient supply of power and energy, Education and human capital development, Agricultural development and food security, Land tenure reforms and home ownership, wealth creation through diversified production, National security, Niger Delta and energy security.

The 2014 global oil crisis led to severe economic crisis in Nigeria, it led to high inflation, low outputs, balance of payments problems, decrease in reserves etc. as at 2015-2017 the economy was still weak. High spending in the 2015 election and the impact of the insurgency in the North also affected the economy, there was much pressure on the domestic price of goods and services, weak fiscal position and economic activities.

According to CBN governor (Emefele, 2017),

The economy officially slipped into recession in the second quarter of 2016, following two quarters of domestic output contractions. To engender growth, growth enhancing and development interventions were introduced to increase access to finance, support real sector growth, infrastructural development, boost domestic output growth and promote structural transformation of the economy.

According to (CBN, 2019),

The government launched the Economic Recovery and Growth Plan (ERGP) in 2017 to provide guidelines for implementing the 2017 budget and tackling the constraints of economic growth, the economy continued on the path of recovery, it gradually exited recession in the second quarter of 2017. Inflation declined progressively from 15.13% in January to 11.44% in December 2018. The 2019 fiscal policy measures granted tax exemptions to small businesses and reduced the tax rate for medium sized companies. The economy was gradually picking up before the hit of the Corona virus pandemic in December 2019. As a result of the outbreak of the corona virus, the fiscal policy measures introduced in year 2020 includes; the release of contingency funds to the Nigerian Center for Disease Control(NCDC), Establishment of covid-19 intervention funds, approval of the employment of 774,000 Nigerians to reduce suffering caused by covid-19, 3months repayment of moratorium for all loans, survival funds to most vulnerable, reduction of fuel price, tax waiver, tax exemption and reduction etc.

Following the conduct of fiscal policy in the years under review, it is seen that the major policy thrust has been the achievement of economic growth and it is on this bases this study seeks to examine the relationship between fiscal policy and economic growth in Nigeria.

Statement of the Problem

Despite the several fiscal measures established since independence and given the importance of fiscal policy in macroeconomic management in Nigeria; economic growth has not really accelerated to the anticipated level. According to (Medee and Nenbee, 2011), Despite the importance of fiscal policy in the management of the economy, the Nigeria economy is yet to achieve an acceptable level of sustainable growth and development. Potential for growth and poverty reduction is yet to be realized.

Over the years, government expenditure has continued to rise due to the increased demand for public goods and services. Government expenditure has been increasing steadily from the year 1986 when it was #16.22billion to year 2019 when it reached #9,714.84billion(CBN statistics,2019). This increase in expenditure has not led to a more significant increase in economic growth. High priority is given to recurrent expenditures than capital expenditures. Though total government expenditure was continuously rising in the 70s but with capital expenditure taking the lead. While recurrent expenditure was put at #3.81billion in 1977, capital expenditure was #5billion. In 1980, recurrent expenditure rose to #4.8billion while capital expenditures was more than double at #10.1billion. Government at this time was involved in fast growth of infrastructures, social services, production of goods which could not be manufactured by private sectors because of the huge capital costs involved. Capital expenditure began to decline after 1980 while recurrent expenditure began to increase, from #36.2 billion in 1990, #79.2 billion in 1994, recurrent expenditure rose to #461.6 billion in 2000, #1.5 trillion in 2007, #2.63 trillion in 2011, #6.25 trillion in 2018 and #4.04 trillion in 2019 while capital expenditure was #24.04billion in 1990, #31 billion in 1994, #239.45 billion in 2000, #759.3 billion in 2007, #1.9 trillion in 2011, #2.87 trillion in 2018 and #2.031 trillion in 2019.

A number of government economic policies intended to stimulate growth in the productive sector within the period under review led to fall in tax returns to government. The federal government has in many occasions operated low tax regime to stimulate growth in the productive sectors. The fiscal policy measures of 1994 includes reduction of tax burden on workers. 1997 includes minimizing of adverse implication of multiple taxation on private sectors, tax relief on interest payment in respect to agricultural loans and waiver of tax clearance requirements on interest, low tax regime was also adopted in 1998 to encourage productive activities in the private sectors and also stimulate consumption demand, there was also tax incentives for the Export Processing Zones, solid minerals, oil and gas etc. year 2000 included a low income tax regime, generous tax incentives and relieves. 2003 aimed at deepening and broadening fiscal incentives to further encourage the industrial and manufacturing sector and continue the structural reforms for improved tax and customs administration. The fiscal policy thrust of 2004 budget was designed to focus on job creation through creation of enabling environments for the private sectors to create jobs, it aimed to simplify the multiple taxes and levies faced by companies and possibly lower companies and personal income tax rates. There was fall in tax revenue in 2006 as a result of the implementation of the Common External Tariff (CET) under the ECOWAS protocol, the granting of duty waiver and tax holiday to foreign investors. 2019 finance Act granted tax exemptions to small businesses and reduced tax rate for medium sized companies.

The fiscal operations of government has continued to result to overall operational deficit over the years under study and they are largely financed by borrowing from the banking industries. The overall fiscal balance was in deficit from 1986 to 1994, it resulted to surplus balances in 1995 and 1996. It turned to deficit again and has remained in deficit from 1997 to date. Generally, increase in government expenditures and reduction in tax rates should lead to increase in investments and employment rate but the reverse is the case, as the total government expenditure continues to increase, the rate of unemployment in the country also continues to rise. These shows that government expenditure has been constantly increasing over the years but in a wrong direction. Evidence from the secondary data collected shows that over the period under study (1986-2019), Nigeria fiscal operations has resulted to persistent deficits. Fiscal deficits are meant to improve economic activities and improve the standard of living in the country. These raised the question of what is the relationship between fiscal policy and economic growth in Nigeria for the period under this study.

Objectives of the study

The broad objective of this study is to examine the relationship between fiscal policy and economic growth in Nigeria. Specifically the study will focus on the following objectives

1. To examine the relationship between government expenditure and real gross domestic product in Nigeria between 1986 and 2019.
2. To evaluate the relationship between government tax receipt and real gross domestic product in Nigeria between 1986 and 2019.
3. To ascertain the relationship between the overall fiscal balance and real gross domestic product in Nigeria between 1986 and 2019.

Literature Review

Fiscal policy

Fiscal policy involves the use of government spending, taxation and Borrowing to influence the pattern of economic activities, allocation of revenue and expenditure and also the level and growth of aggregate demands, output and employment with the aim to achieving internal and external economic balance as well as sustainable development. Taxes (Government revenue) and government expenditures are the primary tools of fiscal policy. Taxes comprises of direct and indirect taxes while government expenditures comprises of Recurrent and capital expenditures.

Government intervention in the economy through fiscal policy is usually enunciated in the budget, their operations has been to manipulate the receipt and expenditure sides of its budget in order to stabilize the economy. In designing and implementing fiscal policy, government plans for either budget deficit, budget surplus or balanced budget. When there is economic recession or depression, government plans for budget deficit which is often referred to as expansionary fiscal policy. In this situation, taxes are reduced and government expenditure is increased. Musgrave and Musgrave (2004) noted that budget policy affects the division of total output between consumption and capital formation and thereby the rate of economic growth. Nevertheless, increase in government expenditures through deficit financing by way of issue of Treasury bills, certificates or bonds or tax will cause crowding effect of private investors. Okoro (2014), if a larger budget deficit leads to higher interest rates and taxation in the medium term and thereby has a negative effect on promoting consumption and investment spending, then, a process of fiscal “Crowding out” is occurring. The reality however, is that often, there have been wastages, some spending has been politicized, and there has been high level of mismanagement, misappropriation and corruption (Osuala, 2014).

Tax Revenue

Government revenues refers to all receipts the government gets including taxes, custom duties, revenue from state-owned enterprises, capital revenues and foreign aids. Tax is a compulsory levy imposed on a subject or upon his property by the government to provide security, social amenities and create conditions for economic wellbeing of the society (Appah, 2004). The two major forms of tax are direct and indirect tax.

The main purpose of taxation is to raise revenue to cover the cost of services provided by the government, control consumption of certain goods, and protect infant industries and other activities in the economy. Musgrave and Musgrave (2006) observed that the economic effects of tax includes micro-effects on the distribution of income and efficiency of resource use as well as macro effect on the level of capacity output, employment, prices and growth.

Government Expenditure

Government expenditures are the expenses of government on what to do for a year, it can be categorized as follows; General Administration, Community services, Economic service, infrastructural services, defense and Transfer. Government Expenditures are of two forms: *Recurrent expenditure* and *capital expenditure*. The major purposes of government spending is to Supply goods and services that are not provided by the private sectors e.g defense, bridges, roads, merit goods such as hospital and schools, welfare payments and benefits such as unemployment and disability benefits. Government sometimes subsidize startup business

or industries that cannot get support from the private sectors e.g Transportation or Agriculture, Government support these sectors to remain in operation or expansion. They spend on education and manpower training to improve productivity, they also spend to help redistribute income and promote social welfare. Changes in government expenditure are the major component of fiscal policy used to stabilize the Macro-economic business cycle.

Fiscal Deficits

Deficit Budget refers to a situation where the total proposed government expenditure is greater than the expected revenue. Deficit expenditure is a financial situation that occurs when an entity has more money going out than coming in. Today and even in the past, budget deficits policy is a famous instrument of fiscal policy used to increase the rate of economic growth of a country (Steven, 2010), the term usually refers to a conscious attempts to stimulate the economy by lowering tax and increasing government expenditure. For the economy to grow as planned in a budget, shortage of revenue resolution from excess expenditure has to be financed by raising fund from other sources available to the government. Umo (2007) Opined that most modern economies are virtually floating credit, this situation arises, not so much because Keynesian Economists have endorsed deficit budgets for stabilization, but because wide and heavy government expenditure in development programs has made borrowing a necessity. Gbosi (2005) reasoned that borrowing is a supplementary instrument of fiscal policy, if fiscal expenditures are directed to the growth sector of the economy; they would be capable of increasing output to the desired direction.

In the thirty-four year period that this study covers, the fiscal operations of the Nigeria government resulted in deficits in so many years. This is as a result of the volatile revenue base which combines with increasing expenditure profile of government, thus making the incidence of fiscal deficits inevitable. Fiscal deficits in Nigeria are generally financed from the banking system and external sources (CBN, 2006). The most popular mode of deficit expenditure is borrowing which is usually done by issuing of government bond (Steven, 2010). Budget deficit as a way of financing was established after world war, oil crisis and financial and economic crisis. Anyanwu (1998) Observed that the persistence of fiscal deficits in developing countries which are mostly financed by government borrowing from the banking system has been blamed for much of the economic crises that beset them since 1980s, including debt overhang and the accompanying debt crises, high inflation, poor investment performance and growth. Bello (2003) asserted that in a country like Nigeria where fiscal operations of the government are characterized by persistent fiscal deficits, fiscal actions have bearing impact on macroeconomic indicators such as inflation, real interest rate, exchange rate and output. The various reasons for fiscal deficit are categorized as political considerations, economic issues and social factors (Gbosi, 2012). The aim of policy makers and political leaders to meet the needs of the citizens as well as delivering dividends of democracy have often driven up government expenditures and in the long run, this will result in deficits as in the case of Nigeria in the recent time. Deficit expenditure however, may also result from government inefficiency.

Economic Growth

Economic growth represents the expansion of a country's potential output or GDP. It is an important macro-economic objective because it enables increased living standards and helps create new jobs. Economic growth is caused by two main factors which are increase in Aggregate Demand ($AD=C+I+G+x-m$) and increase in Aggregate supply (increase in capital, investment, higher labour productivity) it can be measured in nominal or real terms, the latter of which is adjusted for inflation. The real economic growth rate measures economic growth in relation to Gross domestic Product (GDP) from one period to another, adjusted for inflation, it is more useful than the nominal GDP growth rate due to the fact that it takes into account the effect inflation has on economic data. Economic growth has long been considered as an important goal of economic policy with a substantial body of research dedicated to explaining how this goal can be achieved (Fadare, 2010). According to Khorravi and Karimi (2010), classical studies estimated that economic growth is largely linked to labour and capital as factors of production. The drivers of economic growth in an economy as posited by Dwivedi(2008) are the quality of

the labour force, natural resources, capital formation, technological development and political and social factors.

Fiscal Policy and Economic Growth

The potency of fiscal policy to achieve economic growth depends on the transparency and accountability of the fiscal institutions, appropriate combination of fiscal strategy, political stability, socio-political situation of the society, state of nature of the economy at a particular period of time and response of the market forces as the management and suitability of the instruments during each of the state of nature will vary from one period to another. The fiscal policy thrust will be different at each of the economic cycles, the economy will be at different level of equilibrium position (Osuala and Ebieri, 2014).

A variation in the fiscal instruments by way of increase in government expenditure through deficit budgeting and reduction in taxes will positively affect aggregate demand, employment, output and income within the economy; this is referred to as expansionary fiscal policy. However, if government desire to reduce aggregate demand, the above measure would be reversed and this is referred to as contractionary fiscal policy. Increase in government spending or a reduction in taxes tend to pull the economy out of recession, while reduced spending or increased taxes slows down a boom (Dornbusch and Fischer, 1990). Jhingan (1997) argued that government can also use discretionary Fiscal policy by changing taxes and keeping its expenditure constant, changing its expenditure with constant taxes and varying both expenditure and taxes simultaneously. An increase in investment leads to increased production which crates income and generates consumption expenditure.

The interrelationship between public spending and private sector performance is of paramount importance. On one hand, government expenditure provides an impulse for private sector growth while on the other hand, it can be harmful if it results in persistent budget deficit and leads to competition for scarce financial resources from the banking sectors as the government seeks to finance the deficits. In such circumstances, the crowding out of the private sector by the government sector can outweigh any short-term benefits of the expansionary fiscal policy. The key to all these therefore, lies in striking a balance in fiscal management, having enough expenditure outlays to meet the needs of government and support growth but not so much as to deny the private sector the resources it needs to invest and develop.

Annual budget deficit over a number of years will also cause the total amount of unpaid government debt to climb. If the government is running a budget deficit, it has to borrow through the issuance of debt instruments such as bonds or treasury bills (Okoro, 2014). The bone of contention on the use of expansionary fiscal policy has been on how the proposed increase in public expenditure over its revenue should be financed. The contending options have been printing more money (increasing the amount of money in circulation), increasing the interest rate for money deposited from abroad or by long-term borrowing. Okoro (2014), a persistent large deficit can be a problem and depends on the financing of the deficit, if the budget deficit raises to a high level, the government may have to offer higher interest rates to attract sufficient buyers of the debt. This raises the possibility of government falling into a debt trap, where it must borrow more to repay the interest accumulated borrowing. Money printing involves raising money supply to match demand in the economy, However, where the rate of increase in money supply rises above the rate of growth of economic activities and given stable demand function for base money, inflation will result (Ndungu, 1995) more money in circulation makes prices to rise and prices increase because each note (money unit) is now backed by less worth, its purchasing power becomes less. Increasing the rate of interest of foreign currency deposits leads to increase in prices. Prices increase because interest rate in the whole country will increase correspondingly as cost of investment and working capital increases. Easterly and Fisher (1995) argued that where government prints money to cover budget deficits, It is unlikely that rapid money supply growth takes place without fiscal imbalances. On borrowing as an option of deficit financing, borrowing from both domestic and foreign countries has been an unavoidable source of finance. However borrowing which may result in debt crises can lead to high real interest rates in the domestic economy and crowd out private sector investments (Easterly and Schmidt 1991)

The Modern Economic Growth Theory

The leading modern theorist was *John Maynard Keynes* who published his famous book known as *General Theory of Employment, interest and money* in 1936 According to Nwaru (2002) the term “Keynesian” is a generic term that embraces those economists who subscribed to those ideas of John Maynard Keynes about the characteristics and workings of the macro-economy as set in his book. Keynes agreed with the neoclassical that growth is affected by the level of income. If investments temporarily fell off and reduced income by causing unemployment, savings would decline, making funds for investment scarce. He accepted that investment was quite necessary to maintain full employment. The role of the government according to him should be stepped up to stimulate investment through deficit financing. As the government offers the solution of deficit financing, investment will pick up again and employment would increase. As a result, aggregate demand would also increase and invariably, growth resumes. The Keynesian school of thought postulates a positive relationship between deficit financing and investment, and consequently on economic growth. This school of thought sees fiscal policy as a tool of overcoming fluctuations in the economy (Omitogun and Ayinla, 2007) Keynes advocates for increased government expenditures and lower taxes to increase demand and investments which will lead to economic growth and also help pull the economy out of recession. This theory supports expansionary fiscal policy and all fiscal policy objectives focuses on promotion of economic growth through government expenditures and taxes.

Empirical Review

Various researchers have carried out empirical investigation on different aspects of fiscal policy especially as it relates and affects macroeconomic variables of the economy covering different periods, both in developed and developing countries. Fiscal policy is generally believed to be associated with economic growth or more precisely, it is held that appropriate fiscal measures in particular circumstances can be used to stimulate economic growth and development (Khosravi and Karimi, 2010)

Nwafor, P.K. (2020), investigated the effect of fiscal policy on real sector in Nigeria, 1987-2019. The data were analysed with econometric techniques, ADF tests for unit-roots and OLS were used. Findings revealed that capital expenditure, recurrent expenditure and taxation have positive and significant effect on real gross domestic product while government borrowing has negative and insignificant effect on real gross domestic product. The study concludes that fiscal policy have positive effect on the real sector in Nigeria and has helped to improve economic growth and development in Nigeria within the period covered by the study

Titiloye and Ishola (2020), studied the effect of fiscal policy and monetary policy on economic growth in Nigeria 1989-2018, the findings revealed that money supply and government expenditure have a significant impact on economic growth in Nigeria. They suggested that to maintain a stable economic growth in Nigeria, the Central Bank of Nigeria need to inject more money into the economy and the government should use her revenue and expenditures at full optimization.

Symoom (2018), studied the impact of fiscal policy on economic growth; empirical evidence from South Asian countries, the empirical result shows that both government expenditure and tax revenue have no significant impact on real GDP growth in the four countries – Bangladesh, India, Pakistan and Sri-Lanka.

Shuaib, Ekeria and Ogedengbe (2015) studied fiscal policy and Nigeria experience using annual data from 1960-2012. The result of the empirical findings showed that fiscal policy has a direct relationship with growth.

Onyemaechi (2014), studied the impact of fiscal policy components on economic growth in Nigeria using ADF test model and co-integration test, he found out that government expenditure on economic services and transfer payments have not yielded positive results as regards economic growth in Nigeria, though statistically insignificant, expenditures on administration as well as social and community services yielded positive result in improving economic growth in Nigeria.

Alex and Ebieri (2014) carried out an empirical analysis on the impact of fiscal policy on Economic growth in Nigeria (1986-2010). The findings were that, there is evidence of long-run equilibrium relationship between fiscal policy and economic growth in Nigeria during the period under study.

Adeolu, Sunday and Bolarinwa (2012) Assessed how fiscal and monetary policies influence economic growth in Nigeria. The paper notes that there exist a mild long-run equilibrium relationship between economic growth and fiscal policy variables in Nigeria. The paper suggest that for any meaningful progress towards fiscal prudence on the part of government to occur, some powerful pro-stability stakeholders strong enough to challenge government fiscal recklessness will need to emerge.

Medee and Nenbee (2011) carried out empirical investigation on the impact of fiscal policy variables on economic growth, 1970-2009, using vector Auto Regression (VAR) and Error correction mechanism, they concluded that a long-run equilibrium relationship exists between economic growth and fiscal policy variables in Nigeria.

Ogbole, Amadi, and Essi (2011) studied fiscal policy and its impact on economic growth in Nigeria (1990-2006). The study involves a comparative analysis of the impact of fiscal policy on economic growth in Nigeria during the period of regulation and deregulation. Econometric analysis of time series data from CBN was conducted and the result showed that there is difference in the effectiveness of fiscal policy stimulating economic growth during and after regulation period. Appropriate policy mix, prudent public spending, setting of achievable fiscal policy target and diversification of the nation’s economic base, among others were recommended.

Olawunmi and Ayinla (2007) examined the contribution of fiscal policy in the achievement of sustainable economic growth in Nigeria using slows growth model estimated with the use of ordinary least square method, it was found that fiscal policy has not been effective in the area of promoting sustainable economic growth in Nigeria. They however, stated that factors such as wasted spending, poor policy implementation and lack of feedback mechanism for implemented policy evident in Nigeria, which are indeed capable of hampering the effectiveness of fiscal policy have made it impossible to come up with such a conclusion.

Methodology

Research Design is the specification of procedures for analyzing the data necessary to help solve the problem .Ex-post facto research design is used for this study. Econometric model is explored. The models are with emphasis on the fiscal policy variables using the ordinary least squares regression technique. The data used for this study are secondary data collected for the period of 1986 to 2019 and the source is Central Bank of Nigeria (CBN) statistical bulletin for various issues. All the data were on annual basis as provided in the various official reports and publications of the above mentioned data sources.

Specification of the model

The model was analyzed using regression analysis to test the relationship between the dependent variable proxied by Real Gross Domestic Product (RGDP) and the independent variables (Government Expenditure, Tax receipt and overall fiscal balance).

The model is specified as:

$$RGDP = F(GEX, TX, FBAL) \dots \dots \dots EQ(1)$$

The Econometric form:

$$RGDP = b_0 + b_1GEX + b_2TX + b_3FBAL + U \dots \dots EQ(2)$$

Where

Constant **b₀** is the intercept of the relationship in the model. **b₁ – b₃** are the coefficients of each of the independent variables, **U** is the stochastic error terms.

The log-linear function of the model is specified as;

$$\text{Log}(RGDP) = \beta_0 + \beta_1\text{log}(GEX) + \beta_2\text{log}(TX) + \beta_3\text{log}(FBAL) + U \dots \dots EQ(3)$$

Specification in time-series form;

$$\text{Log}(RGDP)_t = \beta_0 + \beta_1\text{log}(GEX)_t + \beta_2\text{log}(TX)_t + \beta_3\text{log}(FBAL)_t + U_t \dots \dots EQ(4)$$

Where;

RGDP_t = Real Gross Domestic Product at time t

GEX_t = Government expenditure at time t

TX_t = Tax Receipts at time t

$FBAL_t$ = Overall National Fiscal balance at time t

U_t = Error term at time t

The Assumptions of the coefficient of the model/A Priori Expectation are: $b_1 > 0$, $b_2 < 0$ and $b_3 < 0$ or > 0 .

Data Presentation

Unit- Root Test

The unit root test adopted here is the Augmented Dickey Fuller Test (ADF) and the results are shown in the table below.

Rule: When testing with ADF method, we compare the critical value with the ADF-value at any percentage of the critical value which can be 1%, 5% or 10%. There is no integration or stationarity, if the critical value is greater than the ADF – value. When this happens we subject the time series to differencing.

Table 4.1 Second Differencing

Variables	ADF – Value	5% Critical Value	Remarks
RGDP	-5.921825	-2.963972	Stationary
GEX	-3.882530	-2.981038	Stationary
GTX	-5.108586	-2.971853	Stationary
FBAL	-8.072750	-2.967767	Stationary

Source: Author’s Computation Using E-view 10

Table 4.2, the result shows that all the variables are stationary at 2nd differencing this implies that the variables are integrated order (2). The lag orders used were automatically suggested by the Schwarz Information Criterion. So the stationarity test is now established.

Co-integration Test

Using the Johansen’s Maximum Eigen value test statistics. The summary of the result of the co-integration is given in table 4.5 below.

Table 4.2 Johansen Maximum likelihood co-integration test result of RGDP, GEX, GTX and FBAL.

Hypothesized No of CE(s)	Eigen Value	Max-Eigen Statistics	0.05 Critical value	Probability
None	0.755092	40.79928	24.15921	0.0001
At Most 1	0.611299	27.40343	17.79730	0.0013
At Most 2	0.214863	7.015029	11.22480	0.2482
At Most 3	0.137236	4.280801	4.129906	0.0458

Source: Author’s Computation Using E-view 10

Max-Eigen value test indicates 2 co-integration equations at the 5% level. This results shows that the null hypothesis should be rejected at 5% level of significance. The test shows that there are two co-integration relationships, thus indicating that there is a long-run relationship between the variables.

Ordinary Least Square Estimation

Table 4.3 Dependent Variable: LNRGDP

Variables	Co-efficient	t-statistic	Probability
C	2.210444	12.08179	0.0000
LNGEX	0.163833	1.592355	0.1219
LNGTX	0.051617	0.559424	0.5802
LNFBAL	-0.064606	-5.222410	0.0000

R-square	0.936696
Adjusted R-squared	0.930147
F-statistic	143.0345
Pro (F-statistic)	0.000000
Durbin-Watson	0.845592

Source: Author's Computation using E-view 10

Discussion of Findings

The result of the estimate shows that government expenditure (GEX) and government tax receipt (GTX) are positively related to real gross domestic product which was used to represent economic growth while there is a negative relationship between Fiscal balance (FBAL) and the real gross domestic Product (RGDP) in Nigeria, for the period under review. The relationship between RGDP and GEX on one hand and RGDP and FBAL on the other hand are in line with the a priori expectations and economic theory while the relationship between RGDP and GTX is contrary to our expectation. The signs suggest that in the absence of all the explanatory variables, one naira increase in government expenditure and government tax receipt will lead to 0.164 and 0.052 billion naira increase in economic growth. It also shows that a rise in Fiscal deficit by one naira will make the real gross domestic product to fall by 0.065 billion naira. This is contrary to the theoretical expectation.

The co-efficient of determination (R^2) is 0.93669, it reveals that about 94% variation in economic growth in Nigeria is explained by the model during the period 1986-2019. This is further supported by the **adjusted R^2** of 0.930147 or 93% which is also high. It means that the variations in the growth of Nigeria economy are greatly explained by the variations in each of the regressors.

The F-Statistic of 143.0345 and P-value of 0.0000 reveals that the model is significant at 5% level of significance and confirms further the strong fitness of the model.

The T-statistics, testing the significance of the co-efficient at 5% significant level. Government expenditures, government tax receipt and fiscal deficit are all statistically significant since their t-values are greater than the probability values of 0.1219, 0.5802 and 0.0000.

Autocorrelation test – The Durbin- Watson statistics with the value 0.845592 which is approximately equal to 1 shows absence of autocorrelation in the model and this will not affect the result. This was further confirmed with the Breusch-Godfrey serial correlation LM Test.

Conclusion

From the findings of this study, given the period under review, we can conclude that increase in government expenditure most especially on capital goods which are productive, leads to increase in economic growth. The main purpose of taxation is to raise revenue that government can use to provide adequate social amenities and infrastructures for the citizens and also to enhance economic growth but these seems to be different in Nigeria as the physical evidence does not show that the funds generated from taxes are used for these purposes. Also tax administration in Nigeria is generally poor and inefficient, the system is faced with many challenges, it impact on economic growth in Nigeria is insignificant. The findings also indicated that fiscal deficit has a negative and significant effect on economic growth of Nigeria. Prolonged fiscal deficits in Nigeria have resulted into mounting public debts and debt overhang. It has a negative effect on output, investment flows, exports etc all these have a very important role to play in promoting economic growth. Therefore considering the period under this study fiscal deficit has not stimulated enough economic growth and it may not be unconnected with the nature of Nigeria's fiscal operations which is characterized by fiscal indiscipline, high debt burden, wastages, corruption, poor budget implementation and monitoring, misappropriation of funds

Recommendations

The study recommends that;

Government should ensure that the tax revenue generated are channeled towards building capital stocks that can create more jobs which will generate more revenue to government through the forms of tax, create an effective and reliable data base for every taxable individual to eliminate or minimize the incidences of tax evasion. Lastly, tax administrators should adhere to tax reforms (low tax regime, tax relief and tax waiver), they should minimize the adverse effect of multiple taxation on the private sectors, and these actions will help to achieve output growth, address the problem of high cost of goods, unemployment and poverty in the country.

The negative effect of budget deficit in Nigeria far outweighs the gain. Government should moderate the level of fiscal deficits and financing of deficits through borrowings. Borrowings leads to debt crises which leads to high interest rates in the domestic economy and crowd-out private sector investment, crowding out of the private sectors outweighs the short-term benefit of the expansionary fiscal policy. Increased borrowing especially domestic borrowing to finance fiscal deficits has contributed to worsening unemployment rate in Nigeria this is because debt servicing obligation is an obstacle to the implementation of new developmental projects because the proportion of funds set aside for new projects that will create employment is used for servicing previous debts.

Government should also give major attention to curbing of corruption in the country; the goals should aim at eradication of corruption, embezzlement and diversion of public funds to private pockets.

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