Original Research Article

FISCAL DECENTRALISATION AND SOCIAL SERVICE DELIVERY POLICY RESPONSE IN NIGERIA.

ABSTRACT

This study examines the impact of fiscal decentralization on social delivery policy response in Nigeria, utilizing panel data for fourteen states in Nigeria for the period covering from 2000 to 2019. Specifically, this study evaluates the impact of fiscal autonomy on social indicators such as infant mortality rate, maternal mortality rate and adult literacy rate. The panel vector error correction mechanism (PVECM) the granger causality test will be employed as the estimation techniques. The study seeks to find out the result of the granger causality test whether there is a one way directional causality running from maternal mortality rate (MMR) to fiscal autonomy (FISA), adult literacy rate (ADLIT) to population (LPOP), population (LPOP) to maternal mortality rate (MMR), fiscal autonomy (FISA) to infant mortality rate (IMR), education expenditure (LEDU) to fiscal autonomy (FISA). Also the results of the panel vector error correction estimates would be sort to find out if fiscal autonomy has positive impact on infant mortality rate, maternal mortality rate and adult literacy rate and policy response in Nigeria. Based on our result, the study would make some policy recommendation for the states to double their efforts in generating their internal revenue to become fiscally autonomous less reliance on the federal government for allocation. Also, there is need for the government to raise her expenditure in education and health sectors so as to increase the literacy rate and health sector outcomes in the country.

Keywords: Nigeria, Fiscal Decentralization, Social Service delivery, PVECM, Granger Causality Test, Maternal Mortality Rate.

JEL Classification: C33, I18, 023, 035, 054,057.

INTRODUCTION

1.1 Background to the study

Fiscal decentralization may be referred to as the process by which a central government cedes powers from the exclusive legislative list to the sub-national government for economic development. (Akai & Sakata, 2002). It can also be referred to as a two-dimensional policy institution that involves either decentralization of a tax instrument, when states local governments bear the responsibility for implementing full expenditure functions.

It is essentially about the allocation of government resources spending to the various tiers of government (Oates, 1972, Tanzi 1995). To enhance economic growth development potentials, developing countries have embraced the decentralization of public spending revenue collection from governments to sub-national government (Aigbokhan, 1999). Thus the issue of tax jurisdictions, expenditure assignment which tier of government can best deliver. Social services to accelerate economic development continue to be the focus of active extensive research (Iwayemi, 2013).

Many developed economies of the world today like Canada, United States, Australia, Brazil Germany have long ago developed elaborate forms of fiscal decentralization between the central other levels of government to address the issue of expenditure assignment tax jurisdiction (Ewefan, 2011, Anyanwu 1999, Aigbokhan 1999, Tella 1999). This policy has been embraced as a strategy for weakening the dominance of the central government fiscal operations to bring these nations into sustainable economic development.

In a bid to foster economic growth development, the central governments owing to her federal structure had had a consistent increase in her annual budgetary expenditure on health education sectors to improve social outcome. Despite increase expenditure in health education sectors in Nigeria, though in a pyramid shape access to healthcare services has been severely limited leading to little or no improvement in the ratio of infant maternal mortality rate, Advent literacy rate.

This ebb is largely due to the fact that expenditure powers are concentrated at the federal level averaging 72.05%, decentralization at the state level averaged only 21.05% while only 6.88% allocated to the local government, similarly revenue concentration at the center averaged 95.26% while revenue decentralization at the state level averaged just 4.24% 0.50% for local governments.

The degree of decentralization of expenditure is higher than the degree of decentralization of revenue. The consequence remains that sub-national governments are usually dependent on federal governments for funds transfer to carter for their expenditure needs which has been insufficient to providing economic development.

Despite the widening appeal of fiscal decentralization, findings in the empirical literature are inconclusive on its impact on economic growth development in Nigeria. While some studies revealed a positive relationship between fiscal decentralization economic development (Chete, 1998, Ewetan, 2011, Philip Isah, 2012), others found a negative relationship between fiscal decentralization and economic development in Nigeria (Aigbokhan, 1999, Philip Isah, 2012). The contradiction in the empirical literature on Nigeria provides the motivation for a re-examination of the relationship between fiscal decentralization social services delivery in Nigeria. Also, this study will examine the issue of causality between fiscal decentralization

social service developments using health education outcome such as infant mortality rate, maternal mortality rate Adult literacy rate.

1.2 Statement of the problem

One of the key constraints to effective fiscal policy is the structure of Nigeria fiscal federalism. This is especially so with respect to the impact of fiscal policy on social services delivery, consisting of education and health outcome. For instance, the structure of fiscal federalism in Nigeria which is characterized by a high level of vertical fiscal imbalance (i.e a situation where in a federation the central government raises more revenue than it spends, while the constituent government raises less). This situation has left the constituent states with less or no advancement in economic development owing to inadequate provision of social services delivery.

According to the United Nations Report (2010) about 14% of the world deaths related to child bearing occurs in Nigeria, while maternal death rates around the world have almost halved over the past two decades. From the report, it showed that Nigeria's rate is 630 deaths for every 100,000 live births, and is the world's 10^{th} highest, behind vine other sub-Saharan African countries.

Additionally, statistics from save the children organization, an international non-profit group revealed that almost 800,000 Nigerian children die every year before their fifth birthday, making Nigeria the country with the highest number of new born deaths in Africa. According to a recent estimate developed by the WHO, United Nations Children Emergency Fund (UNICEF), United Nations Population Fund (UNPF) the World Bank; about 358,000 maternal deaths occurred worldwide in 2008 out of which 50,000 occurred in Nigeria. The report, however, notes

that the MMR (deaths per 1000,000 live births) for Nigeria declined from 980 in 2000 to 840 in 2008 which is described as "insufficient progress (WHO, 2010).

The world health statistics of 2015 also reported an increase in Nigeria maternal mortality rate to 1100 in 2013. The wide disparity of MMR of different regions of Nigeria is also noteworthy. According to the society of Gynecology obstetrics of Nigeria (SOGON) in 2014, the MMR in Kano state (North West) was 7523 per 100,000 compared to 783 per 100,000 in Enugu state (South-East) See , Ome Aghoja, Aisien, Akuse, Bergstrom Okonofia, 2013).

This scenario is largely due to the ineffectiveness of Nigeria fiscal federalism. The practice has seen to a large extent increase in fiscal spending in improving health education outcome in this regard. Over the years however, Nigeria budgetary expenditure in meeting MDG's goal 2, 4 and 5 have been resounding in achieving sustainable development.

There has been a consistent increase in budgetary transfers, conditional non conditional cash transfers to sub-national governments to caution the menace posed by infant maternal mortality rate. In contrast, this spending has shown little or no positive result. This study therefore is poised to answer the following research questions:

1. Why is infant mortality rate still on the increase in Nigeria in spite of the huge budgetary allocation to sub national governments?

2. Why has there been little or no improvement in eradicating maternal mortality rate in Nigeria?

3. How would fiscal decentralization improve literacy rate in Nigeria?

1.3 Objectives of the study

The central objective of this study is to investigate the relationship between fiscal decentralization social service deliveries (development) in Nigeria. Specifically, the objectives are:

1 To investigate if the decentralization of revenue expenditure policy will assist in reducing infant mortality rate in Nigeria.

2. To examine the effect of fiscal decentralization on Adult literacy rate in Nigeria.

3. To determine the causal relationship between fiscal decentralization maternal mortality rate in Nigeria.

1.4 Research Hypotheses

i. H_0: Decentralization of revenue expenditure policy has no relationship with infant mortality rate.

ii. H_0: Fiscal decentralization has no effect on adult literacy rate in Nigeria.

iii. Ho; There is no causal relationship between fiscal decentralization maternal mortality rates in Nigeria.

1.5 Scope of the study

The focus of this research is on Nigeria. The study had a sample of fourteen states drawn from the six Geo political zones of the country. These states include Cross River, Akwa Ibom, Rivers, Bayelsa, Delta, others are Kano, Kaduna Jigawa. In the other zones, we have Lagos, Ogun, Kwara, Adamawa, Enugu, Anambra, The choice is made out of the fact that Nigeria is on a drive towards achieving the sustainable development Goals (SDG's). More importantly, the role of sub-national Governments in achieving increasing service delivery is increasingly appreciated in the study of fiscal decentralization social service development.

The decentralization of revenue expenditure responsibility to improve social services in health education outcome via revenue autonomy of sub-national governments remains the gap to be addressed in this study. The choice of the sample is based on the large size of the Country which the researcher may not be able to cover appropriately due to limited resources.

Due to non-availability of states data to cover the variables drawn up in the model, the study therefore, covers the period between years 2000-2019.

1.6 Significance of the study

This study brings to focus the contributions of fiscal decentralization social service delivery in Nigeria. Using education health outcomes as social variables to harness economic development, bearing in mind the importance of a better public service to improving living conditions of citizens, the devolution of powers from the federal government to sub-national government increases the revenue expenditure potentials of the tiers of government to meet citizens' needs. Most of the works on decentralization and economic development is based on the assumption that the transfer of powers resources affect economic growth through the effect it has on the allocation of resources across expenditure categories.

The study is significant to the academic, research based institutions mostly the government of Nigeria who have failed in this direction, thereby making sub-national governments to usually been dependent on central financed allocation for their own resources because they have limited tax possibilities. This scenario therefore brings a limit to their revenue owing to the consistent shortfall in federations account statutory allocation.

Additionally, knowledge from this study would give us idea of the rationale behind the slow pace of economic development in Nigeria compared to other fast developing nations of the

world. Therefore, to achieve the desired feat, a complete decentralization of expenditure revenue assignments must be reviewed to suit the trend.

2.0 LITERATURE REVIEW THEORETICAL FRAMEWORK

The review of literature is based on the specified objectives. The study therefore reviewed literatures on fiscal decentralization on health and education outcome using infant mortality rate, maternal mortality rate, Adult literacy rate as variables under studied.

2.1 Fiscal decentralization infant mortality rate

Infant mortality is believed to be a barometer of health status of a society (Kaufman et al 2005). In case fiscal decentralization is successful in reducing infant mortality rate IMR. It is evident that it can improve the health condition of a society.

Infant mortality rate (number of infant deaths per 1000 live births) is an indicator used to compare the health status of a country's population (WHO, 2011) Nigeria figure on the index remains high in the world today, even by the standard of developing countries. Currently, one tenth of children born in Nigeria dies under the age of one year (infant mortality rate) of 100 per 1000 live births, a fifth die before their fifth birthday, under five mortality rate of 201 per1000 live births (National Population Commission, 2009).

According to the Nigeria health journal, (2014) only 5% of the country's budget is allocated to health care over the years. Thus deficit in fiscal allocation has brought about the health menace under study. The nation's poor healthcare delivery via infant mortality rate has been blamed on the country's practice of fiscal federalism. This practice has brought about a

shortfall in financial resources of sub-national Governments. Who are quite far from achieving desired economic development

To this end, the practice of fiscal decentralization as a macroeconomic policy has been considered as an effective policy provision of social services delivery thereby increases efficiency, entrance good governance above all foster economic development of nations. Greater fiscal decentralization is consistently associated with lower infant mortality rates.

Robalino et al (2001), Assed the impact of infant mortality rates of fiscal decentralization (as measured by the share of public expenditure managed by local governments), using a panel data, with samples from both high low income countries for the period 1970-1995. They found that fiscal decentralization was associated with a significant reduction in infant mortality rates, particularly, in countries that promoted political rights. Based on the obtained results, the authors contained that greater fiscal decentralization will only be successful in lowering mortality rates of there is significant local institutional capacity. In addition, the result showed that; in countries where the sub-national Governments are responsible to manage higher share of total health expenditures, tend to have better health indicators including infant mortality rate (IMR). Their analysis demonstrates that sub-national governments with better administrative capacity are more effective providing better health care services. This implies that for fiscal decentralization to be more useful it needs to be accompanied with administrative decentralization.

Country specific analysis has also been conducted for the assessment of fiscal decentralization on health outcome. The result showed that fiscal decentralization has a positive impact in reducing infant mortality rate in Colombia. For instance, Schwartz (2002) study on the philipines suggests a positive correlation between fiscal decentralization health outcomes. The study compares the level composition of health expenditure during both pre post devolution reforms in

1994. Empirical results of the study shows a comparative increase in per capita health expenditures following the devolution, the rise on expenditure is more prominent in provincial level compared to municipal ones which may be because the former are responsible for major health projects hospitals.

Another interesting finding of same study is that after the devolution, the sub-national governments tends to have higher allocation for health sector at the expense of other social services. Other studies also showed similar results regarding the positive impact of fiscal decentralization on infant mortality rate. For example, Arze et al (2008) showed a common trend in Bolivia, Ecuador, El salvador Nicaragua where higher health expenditure is followed by fiscal decentralization Younger (1999) finds out that public healthcare services are more poor in Ecuador, Likewise, Seto et al (2012) posit that fiscal decentralization has a positive impact in reducing infant mortality rate (IMR) in Colombia.

In a related research carried out by Eugene et al (2014), Colombia has experience a signficant decrease in infant mortality rates, in parallel, an increasing decentralization of health outcomes. The most specific health competencies shifted to the municipalities lie in the demands of promotion for health education preventive healthcare in this way, municipalities were encouraged to channel local resources to meet their new responsibilities at local level (DNP 2008).

In figures, local health resources as a proportion of total health spending, increased from 1.1% in 1974 to 6.1% in 2003 (Baron 2007) to this end, fiscal decentralization for saw a reduce infant mortality ratio in Colombia.

In Rwa, for example, infant mortality rate decreased from 107 per 1000 live births in 2000 to 86 in 2005 62 in 2007 58 in 2011, due to a rapid expansion in health service delivery. It has

dramatically accelerated the trend of progress on health indicators putting it back on track to reach the millennium development Goals (MDGs). Health indicators in Rwa improved dramatically in recent years projections for the coming years are positive. After an initial surge following the decentralization policy in the health sector.

Similar development could be traced to China's Regional Infant Mortality rate after the decentralization policy. According to Brock et al (2015) infant mortality rate (IMR) in middle income countries is most likely to be underreported in general China as a middle income country with a strict population control policy in a society biased towards male births is therefore quite likely to have a high underreporting.

A comparison of year 2000 IMRs in China's provinces lower middle income group countries shows China's IMR compared favorably with other countries. The infant mortality rates in Beijing, Tianjin Shanghai are even lower than the 6.78 average of the high income country group. Among the four "super" municipalities that are directed administered by the central government, only the newly created municipalities in 1997 – Chonqang- has a relatively high (21.10) infant mortality rate. Changing is high as it was a part of Sichuan province that is an inl relatively underdeveloped region. To strengthen in development coordinate the residents resettlement from the resevour areas of the three Gorges Dam project, changing was upgraded into the only "Super" municipality in Western inl china. The five ethnically minority populated autonomous regions like inner Mongolia, Gungxi, Tibet, Ningxia Xinjiang have lower infant mortality rate (IMR) same as Guizhon Yunnan. This is not suprising since the autonomous regions receive more transfers from the central government for the consideration of national unity pacifying the minorities. Even being compared with the average level of 28.83 of the upper middle income group, China is still one of the best performing countries in the world today.

During the past thirty years (30 years), falling provincial IMRs (Infant Mortality Rates) were expected given a regional decentralized authoritarian system resulting in spectacular poverty reduction economic growth (Xu 2011).

A large body of literature has identified many potential benefits of fiscal decentralization. Infant mortality rate is more affected by public healthcare investments individuals' life style. Using both low high income 1970-1995 cross country data with OLS fixed – effect estimations, Robalino, Picazo Voetberg (2001) find a significant impact of fiscal decentralization on infant mortality reduction even in an environment of high corruption.

Uchimura Jutting (2007) analysed a panel of countries from 1995-2001 find that more fiscally decentralized countries have lower infant mortality rates if they have a well-functioning transfer system among sub-national governments a strengthened local fiscal capacity. However, their study does not control for healthcare input factors such as healthcare expenditures or healthcare output factors such as the number of hospitals or doctors. As these important input/output variables have been included as proxies for healthcare physical human capital in most previous infant mortality research, we also include them.

Moreso, Asfaw, Frohberg, James Jutting (2007) use rural infant mortality rate (IMRs) 1990 -1997 in 14 Indian states to document that fiscal decentralization play a statistically significant role in reducing rural IMRs. They also found that a low level of political decentralization in reducing infant mortality rate in rural India.

In contrast, Jin Sun (2011) use chinese provincial infant mortality death 1980-2003 with both OLS panel feasible generalized least squares to show an overall adverse impact of fiscal decentralization on the infant mortality reduction. Following Zhu, Fu LI (1998) Tang Bloom (2000) focus on rural areas present a case study of a poor rural country in China. They find little

evidence that radical fiscal decentralization leads to increased healthcare outcomes. Green Collins (1994) even suggests some degree of centralization instead of fiscal decentralization in resource allocation planning for primary health care.

2.2 Fiscal decentralization maternal mortality rate

Maternal mortality has been of great concern in Nigeria. The country is not lagging behind in regional comparisons but has also not been able to meet her millennium development goal (MDG) target on maternal mortality rate. Despite high utilization of Ante-natal care (ANC) services high rates of skilled birth attendance; maternal mortality has remain stubbornly above 800 per 100,000 live births in the year 2014 (CBN 2015). This is about five times as high as the MDG target set at 102 per 100,000 live births also represents one of the highest maternal mortality rate in African (UNICEF 2014).

With maternal mortality being an integral part of the MDGs developing countries have been experimenting with different types of intervention to increase access utilization of maternal care services including for example, subsidies, vouchers or conditional cash transfers programs (CCTs). However, evidence on the effectiveness of these interventions is still scarce the debate on the debate on how best to promote access utilization is still ongoing. To this end, fiscal decentralization has consistently been advocated for even development in improving maternal mortality ratio as a mechanism for increasing the responsiveness of social services.

Evidence of fiscal decentralization in reducing maternal mortality rate has firmly been supported by many literature. Sekabaraga et al (2016) who carried out a work in Rwanoda posit that the impact of fiscal decentralization in improving health outcome cannot be over emphasized. In their study, they found that maternal mortality ratio has declined at an annual rate of 12.1% to reach 383 per 100,000 live births in 2008, ranking it among the best – performing

countries in the world. The rate decline far exceeds the 55 rate needed to meet the MDG target of reducing the maternal mortality ratio by three quarters between 1990 and 2015.

These achievements have been the result of innovative strategies (partial decentralization in health expenditure) to address some of the key challenges affecting maternal mortality. The share of women delivering their babies in health facilities has steadily increased, rising from 255 of pregnant women in 2000 to 45% in 2008. Many challenges remain but preliminary data from the ministry of health for 2010 suggest that this figure has risen to two-third of all pregnant women; the finding should be validated by the 2010 demographic health survey. This development came as a result of policy changes.

Indonesia, embarked on a far reaching decentralization reform in 2001, granting a substantial degree of political fiscal autonomy to district governments which are now to a large extent responsible for social service delivery. With this relative autonomy district governments in Indonesia have gradually implemented local healthcare financing schemes, collectively known as Jamkesda (Jamanan Kesehatan Daerah – Regional Health Insurance). The first local Insurance Scheme emerged soon after decentralization was realized but the proliferation of the Jamkesda schemes accelerated after 2005 in the wake of the nationwide subsidized social health insurance for the informal sector the poor (Baron, 2003).

This measure of decentralization enabled a decrease in the ratio of maternal mortality rate in Indonesia between 2002 till date. Major progress has also been made in extending the coverage of vitamin A supplementation among children women through mass campaign integration into routine health facility services. Improvement in the use of women's health services are also evident with significant increase in the proportion of assisted birth deliveries the

number of emergency obstetrical cases referred. The use of modern contraceptives increases ever observed.

The proportion of women having at least one antenatal consultation rose from 58% in 2002-96% in 2011. The proportion of assisted deliveries increased from 39% in 2005 to 52% in 2007. This progress occurred in a context in which annual total per capita health expenditure doubled, from 817 to 834 dollars between 2003 and 2006.

Nauman (2014) posit that maternal mortality rate is a very important indicator reflecting a country's economic, cultural or health system development, also recognized worldwide. Maternal mortality includes the deaths during pregnancies or the ones 42 days after deliveries. Traditionally, thus indicator includes direct maternal deaths from pregnancy, indirect maternal deaths from pregnancy maternal deaths that occur during pregnancy. As a worrying factor in the world today, many countries have improved on her public policies in a bid to meet MDGs target. Among these policies is fiscal decentralization.

De Alegri et al (2012) show that in Burkina Faso due to improved public policy in health, 80% of subsidy on delivery services increased the number of institutional deliveries from 49 to 84% over a five year period. Bangladesh, Cambodia Kenya, have been experimenting with conditional cash transfers for maternity care. While studies have found generally positive effects of conditional cash transfers on institutional deliveries, these schemes appear to be less successful in promoting improving ante-natal care.

Gawi et al (2008), (2009), Budiyati et al (2013) showed that in Indonesia, fiscal political decentralization in 2001, district government have increasingly engaged in local health insurance programs. This development has been mainly driven by coverage gaps in national health insurance programs as a result of local political factors. This measure has brought a major

improvement in the health outcome, hence, reducing maternal mortality ratio in Indonesia. These success can also be attributed largely to an increase in the use of essential health interventions, particularly high impact interventions that are critical in reducing maternal mortality rate.

In a related development Zhu, Fu Li (1993), (2006), (2013) revealed that in 1990 the maternal mortality ratio in Indonesia was 600 per 100, 000 live births in 2010. After the decentralization policy. To achieve MDGs, Indonesia need to reduce maternal mortality to 150 per 100, 000 live births in 2015. This means a decrease of 70% per 100,000 live births must be accomplished within five years. Indonesia's vice minister of health stated that achieving MDG goal 5 is the most challenging compare to other MDG goals. This measure has also been enabled by improvement in the number of skilled health personnel in Indonesia between 1991 and 2007 (32 percent of 79 percent). According to report, 60 percent of births occurred at home. However, these increases are not yet being reflected in reduced maternal mortality.

2.2.1 Fiscal decentralization Adult literacy rate

The practice of federalism in Nigeria has hindered to a large extent the development of education in spite of the huge annual expenditure on education for many years. Over the years, however, Adult literacy rate ranges between 59 percent 88% among the thirty six states of Nigeria, with Kano having the highest range between 73 percent 83 percent in the period UNDP (2014). According to MDG 2005 report, literacy level in the country has steadily gradually decreased especially between 15-24 years group.

By 1999 the overall literacy rate had declined to 64.1 percent from 71.9 percent in 1991. The trend was in the same direction for male female members of the 15-24 years age bracket. Among the male, the rate of declined from 81.35 percent in 1991 to 69.8 percent in 1999. The decline among the female was from 62.49 percent to 59.3 percent during the same period. In

spite of consistent budgetary allocation, conditional cash transfer, grants, out of pocket expenses etc. the rate of decreasing literacy rate in Nigeria have become a worrisome issue.

In recent times, emphasis policy implementation on improving education outcome in developing economies have shifted towards fiscal decentralization. Existing literature on this context have shown that greater fiscal decentralization is consistently associated with improving adult literacy rate.

In an empirical evidence conducted by Robalino et al (2001) Emperies suggest a statistically significant positive association between fiscal decentralization the literacy rate. The result showed that transferring expenditure responsibilities to provincial or sub-national governments can increase the enrollment rate against the quality of schools, due to which pupils tend to retain in schools which results into more literacy rate in relation to this, one unit increase in the share of provincial government expenditure share leads to a vise in the literacy rate by 0.4 percent in the first model 0.99 percent in the second model.

The above result is in coherence with the existing empirical works of Gupta et al (2002) Psacharopoulus (1994) showed that more expectancy on social services, such as education is highly likely to enhance economic growth, decrease income inequality reduce poverty. Psacharopoulus (1994) illustrates how expenditure on basic education is associated with high social rate of return whereas in Balochistan total literacy rate was recorded as 45 percent with 62 percent male only 23 percent female literacy rate.

The relationship between fiscal decentralization literacy rate at provincial level is strongly significant positive which suggests that different degrees of fiscal decentralization across provinces do not affect its impact on education outcome. However, a portrayer of this positive statistically significant association underlines the fact that poorer provinces like

Balochristan IKPLC with high illiteracy rate since 1990's have made noticeable improvement in their literacy rate thereafter. Despite several constraints, the correlation between decentralization literacy rate is strongly significant with a positive coefficient across all provinces.

Similarly, Alfonso Mello (2000) who offers some data on changes in terms of human development indicators in Brazil between 1990 2000. As the data suggests, education indicators have improved across the country, with the disparity between regions decreasing somewhat over the period. Adult literacy rate has increased from 68.84 percent to 78.23 percent over the period school attendance from 55.52 percent to 72.95 percent. The ratio of indicators for the south eastern region to the North eastern region gives a sense of the magnitude of the disparity between the country's richest poorest regions. In terms of rate of school attendance for example, the poorest regions have all but caught up with the richer ones, the disparity in terms of adult literacy rate has also diminished in Brazil.

Furthermore, Ghuman Ranjeet (2013) found the impact of fiscal decentralization on adult literacy rate in India during the post decentralization period within a span of three years. (1997-2000), 30,000 new schools were opened under education guarantee scheme (EGS) against the opening of 80,000 schools spread over 50 years of the pre-decentralization phase. The beneficiaries included 2 million students, majority of which were tribal girl children from the most poorest 40 percent households. On similar link under the adult literacy model, the literacy rate witnessed an increase of 20 percent points from 44.7 percent. In 1991 to 64.1 percent in 2001 (McCarten Vyasulu 2004, Mehrotra, 2006).

2.2.2 Fiscal policy revenue commission in Nigeria

An overview of the journey to the state of the nation's present revenue allocation is essential as various formulae have at one time or the other been adopted of note, in recommending a revenue allocation formula, factors that are generally considered include the derivation need principles that can foster ensure equity to all sectors of the country. Omotosho (2010) opined that Nigeria revenue allocation formula is based on two major principles' equity principles which include even development national interest, continuity in government service, minimum responsibility of government, financial comparability, national minimum stard, l mass terrain as well as the efficiency principle that considers derivation, independent revenue, absorptive, capacity, tax stard fiscal efficiency. Notably, revenue sharing practices in Nigeria emphasizes equity over efficiency as it is the case in most developing countries.

In Nigeria situation, agitations counter agitation by political pundits pressure groups have led to constant review of the revenue allocation such that between 1946 2001, a couple of commissions committee have held away on the mater among which are:

- Sydney Philipson commission (1946). This commission introduced three principles, namely derivation, development process population. By derivation, it means each unit of government would receive from the central purse a proportion of its contributions to the central pool the commission went further to identify sources of revenue collected by the federal government include customs exercise etc. the criticism that followed this provisions led to another commission in 1991 chaired by both Sydney Philipson Hicks Philipson to come up with a more acceptable revenue allocation formula.
- Hicks Phillipson Commission (1951). This commission recommended four general principles which are independent revenue, derivation, need national interest as the

criteria for revenue sharing. It was also criticized over the control of government collection of duties tax on premium motor spirit.

- Louis Chicks Commission (1953). The commission was to adjust the previous recommendations this came up with a main principle it expatiated derivation.
- Raisman Commission (1957). This commission arose from complaints dissatisfaction with the derivation principle subsequently led to the creation of distributive pool account complete regional jurisdiction over personal income tax. It further recommend need balanced development minimum responsibility with a percentage division of 40% to the north, 31% to the east, 24% to the west 5% to the southern Cameroon.
- Binns Commission (1964). This commission however rejected the principles of need derivation; it thus increased the percentage of general important revenue, mining rent royalties payable to the derivation pool account from 30% to 35% further recommended percentage division of 42% to the north, 30% to the east, 20% to the west 80% to the west.
- Dina commission (1968). This commission was to look into the distribution of revenue following the splitting of the nations into twelve states. It however renamed distribution pool account to state joint account also created special grant account advocated for a permanent planning fiscal commission. It also recommended national minimum stards, balanced developed, basic need national interest in the distribution of revenue.
- Aboyade Technical Committee (1977). This commission also supported national integration. The committee recommended for all the federally collected revenue to be pooled into the federation account allocated there from among the federal, state local governments. It is noteworthy, here, that the local governments started receiving their

revenue allocation directly from federation account as the third tier of government after the Aboyade's committee submission of its requirements for the share proportion of 57%, 30% 10% for federal, state local governments respectively with the remaining 3% for special grant.

- Pius Okigbo Commission (1980). This commission is saddled with the responsibility of looking into the derivation, even development, equitable distribution national as well as make recommendation on revenue sharing formula among the levels of government. It thus recommended percentages on principles of population, social development internal revenue efforts. It recommended revenue allocation sharing formula to be 53%, 30% 10% for the federal, state local government respectively also recommended 7% as special fund which should be distributed among federal capital territory (FCT), mineral producing areas, derivation, ecological problems, revenue equalization fund. On its acceptance, the federal government effected some changes as 53% 35% 10% for federal, state local governments respectively. The government directed that the state revenue allocation of 35% should be applied as follows, equality of states 30.5%, ecological problems – 1.0% derivation principle 3.5% (Ugwu, 2012). This system of revenue allocation also received political social criticism but the federal military government through their decree only effected changes regarding to derivations. Derivation of 2% was to be drawn from revenue relating directly to the state in which mineral were extracted while 1.5% went into fund for the development of mineral producing area of the country.
- Revenue Mobilization Fiscal Commission (1988). This commission introducing the principles of equity of states, population, social development factor, l mass terrain,

internal revenue efforts special fund, it recommended federal government gets 50%. The revenue sharing journey in the country have however seen other laws decrees promulgated, among which are; decree 15 of 1967, 13 of 1970, 9 of 1971, decree 7 of 1975 (Oyeneye, et al 1988 cited in Ihedioha 2013). The 1992 Revenue Allocation Formula as amended by various intervening issues like the 1999 constitution, supreme court judgement presidential adaptation orders are part of the defining characters of allocation of resources in the country today. Note worthy, by decree 106 of 1992, the revenue allocation formula before the coming into the effect of 1999 constitution was

a. Federal government 48.55
b. State government 24%
c. Local government 20%
d. Special fund 7.5% special fund sub-divided into:
    i. Federal capital territory – 1%
    ii. Development of mineral producing areas based on derivation – 3%
    iii. General ecological problems 2%
    iv. Derivation 1%
    v. Stabilization account 0.5%

in the meantime, section 153 of the (1999) Nigerian constitution provide for the establishment of certain federal executive bodies, sub-section (a), provide for revenue mobilization allocation fiscal commission with functions, composition powers as provided in the third schedule of part 1. As stated in section 32 of the schedule among others, state review from time to time the revenue allocation formula principles in

operation to ensure conformity with changing realities. After a government case decided by the supreme court that modified the allocation of 7% of the federal allocation to special fund, the then president Obasanjo on 8th May, 2002 by an order allocation of revenue (federation account etc) changed the existing formula to federal government 56% – states government 24% local government 20% with 13% to be used for derivation pursuant to the provision of section 162 (2) of the country. The federal government's 56% was further explained as bring sub-divided in the following manner: federal government's 56% was further explained as being sub-divided in the following manner: Federal government 48.50%, general ecological problems 20%, federal capital territory 1% stabilization account 1.5% development of natural resources 30%.

Consequently, in (2002) there, was another order that modified the previous order that shared the revenue as, federal governments 54.68%, state government 24.75 local governments 20.6%. By March 2004, the Revenue Allocation formula was again modified by a circular from the ministry of finance putting revenue sharing formula as; Federal government 53.69%, state government 24.72% local government 20.6% which is still in use till date (Ihedioha 2013).

2.3 Empirical literature

Deribe (2015) investigated empirically the impact of fiscal decentralization in Ethiopia, Assessing majorly its achievements challenges since 1980 to 1991. The study mainly employed quantitative approach based on a panel data on revenue expenditure assignments between the federal governments of Ethiopia regional state governments. It applied two stard measures of fiscal decentralization expenditures ratio (FR) revenue ratio (RR). The findings showed that

there is a mismatch between expenditure financial autonomy of sub-national governments in the devolution process, which in turn creates vertical imbalances. Another major finding of the study is that intergovernmental fiscal transfers are a major source of revenue for regional states of government which shows heavy dependence on federal government subsidy.

Akpan (2011) further posits out that fiscal decentralization is consistently associated with lower mortality rate higher literacy rate: benefits from fiscal decentralization are not particularly important for states with high population low internally generated revenue, improved state autonomy reduce dependence on transfers from the centre. The study was based on a panel of the 36 states federal capital territory in Nigeria. The estimates of the variables were done using rom fixed effect procedures, supporting the need for revenue autonomy of sub-national governments as this autonomy enhance reduces infant mortality rates. Also, Udoh, Afangideli Udeaja (2015). Using the autoregressive distributed lag ARDL/Brs testing co-integration approach data for 1980 to 2012, in Nigeria; found that a long run unidirectional relationship exist amongst fiscal decentralization, human resource development economic growth. However, in the short run expenditure decentralization has no import on human resource development. Human resource development in Nigeria is determined by such factors as expenditure decentralization economic growth. The result therefore showed a strong positive significant relationship between economic growth human resource development. Also efficient methods must be adopted to allocate resources at the sub-national level of governments.

The works of Gemmel et al (2003) investigated whether the efficiency gain accompanying fiscal decentralization generalization generate higher growth in more decentralized economies, applying pooled mean group techniques to a panel set of 23 OECD countries from 1972-2005. They found that expenditure decentralization tends to be associated

with. Since OECD countries are substantially more in spending than revenue decentralization, this is consistent with Oates (1993) hypothesis that maximum efficiency gains require a close match between spending revenue decentralization. It suggest reducing expenditure decentralization simultaneously increasing the fraction financed locally, would be growth enhancing. In the same vein Rodriquez-Pose Kroijer (2009) summarized arguments in favour of fiscal decentralization in Eastern Europe. Using a panel data approach; their results claimed, that it promotes higher efficiency, better public service, greater transparency eventually economic growth. Its often argued that decentralization increases economic efficiency because local governments are better positioned than the rational governments to deliver public services as a result of proximity informational advantage. Thus proximity is particularly important in low income countries or emerging markets where is absence of market opportunities vulnerable population rely heavily on state action for their survival. Other studies that have reported a positive statistically significant impact using these measures include: Limi (2005) who reported a significant positive impact of expenditure decentralization per capita GDP growth in a panel of 51 developed developing countries covering 2007-2008; Akai Sakata (2002), also found that the ratios of local government revenue expenditure to combine states local governments revenue expenditure had a positive statistically significant impact on state GDP in a panel study of US states covering 1993-1996. Yilmaz (1999) distinguished between unitary federal states in a panel annual data for 1971-1990, found that fiscal decentralization had a positive statistically significant impact on growth in unitary states; similarly, Thieben (2005), reported a positive relationship between decentralization growth. When decentralization is increasing from low levels, but that as decentralization increased, the relation eventually turned negative in a cross section of high-income OECD economies using annual data for 1973-1998, Lim Liu (2000)

who reported that the marginal relation rate of national budget revenues collected at the provincial level had a positive statistically significant impact on the growth of real per capita GDP in China following the fiscal decentralization of the 1980s.

In contrast, Zang Zou (1998) found a negative relation between fiscal decentralization the growth of provincial incomes in China during 1980-1996. Studies that have found no significant statistical relation between growth fiscal decentralization include: Davoodi, Xie Zou (1998), who reported a negative but no statistically significant effect of expenditure decentralization on economic growth for developing countries no clear relationship for developed countries using panel data for 46 developed developing countries covering the period of 1970s – 1989 in United State of America. The study found that existing spending shares for states local government have been consistent with growth maximization. In this sense, further decentralization in public spending may be harmful for growth. Woller Philips (1998), who reported no significant relationship between the ratios of sub-national revenues expenditure to total revenue expenditure using average data for 1974-1991 for 23 developed developing countries.

2.4 **Theoretical Framework**

There are several economic political arguments for the practice of fiscal federalism in a country. While the political arguments are largely based on the heterogeneous characteristics of the different regions making up the country, the economic justification is usually based on the need to promote efficiency in the use of natural resources. Therefore, in discussing issues of fiscal decentralization and economic development generally, the roles of the various levels of

governments and their partnership arrangements with society, in respect of the management of the economy, are usually the focus of attention. This partnership is implicitly understood to exist with a view to creating responsible governments that work to serve their people. More specifically, it assumes the devolution of fiscal responsibilities among the federating units. It is reflected in government oriented structural policies (including trade, revenue source responsibilities expenditure assignments, borrowing sector policies) which impact positively on governments expenditure, incentives for private investments production, as well as the provision of complementary services to private sector initiatives. As a measure to enhance economic development, it will also promote virile market institutions, social mobilization effective participation by society.

In the context of this study several theories like Tiebout, Leviathan have been adopted Wallace Oates (1972). Luiz de Mello (2002) "proposed a straight – for-ward theorem that formalized the basic efficiency argument for the decentralization provision of certain kinds of public goods". The theorem lays out a set of goods to be pareto-superior to a centralized determination of public outputs.

The decentralization theorem: for a public good the consumption of which is defined over geographical subset of the total population, for which the cost of providing each level of output of the good in each jurisdiction are the same for the central or for the respective local governments: it will always be more efficient for local governments to promote the pareto-efficient levels of output for their respective jurisdiction than for the central government to provide any specified uniform level of output across all jurisdictions.

Tiebout hypothesis: Tiebout hypothesis believes that the local governments have a more precise detailed knowledge of the needs of the local population, thus, making them more readily

able to accurately tax the people on the goods services it provides to the local population. He described municipalities within a region as offering varying baskets of goods (governments' services) at a variety of prices (tax rates). Tiebout argues that municipalities have two routes that they can go about in trying to acquire more persons in their community. One route is for the municipalities to act as a cartel, enforcing a singular tax rate among the various communities. He claimed that this will shrunk the right of voice exit to the individual. The other option for the individuals to engage in tax competition which will yield a positive result to economic growth. The theorem posits that regional or local governments are in a position to adapt output of public services to the preferences particular circumstances of their constituencies, as compared to a central solution which presumes that one size fits all. Also in setting of mobile households, individuals can seek out jurisdiction that provide outputs well suited to the tastes, thereby increasing the potential gains from the decentralized provision of public services. Decentralization may encourage experimentation innovation as individual jurisdictions are free to adapt new approaches to public policy. The most important contribution in the public-choice perspective of fiscal federalism.

The Leviathan hypothesis: This theory is as proposed by Brennan Buchanan (1980). According to the theory, fiscal decentralization is a mechanism for constraining the expansion or tendencies of governments. Under this approach central government do not maximize social welfare operate like monopolists (or leviathan) in order to increase their control over the economy's resources. Therefore, on the crucial assumption that households firms are mobile, splitting the central governments in many local governments introducing fiscal competition among them through a decentralized fiscal system should produce the same effect of explicit fiscal constraints on the central governments taxing powers.

Wallace Oates theory: Oates (1972) Tiebout (1956) offer a theoretical framework in which fiscal decentralization can guarantee an efficient provision of public goods simply because local preferences are better satisfied than in the case of centralization. Both previous approaches assume a benevolent governments, but the leviathan hypothesis is based on the opposite assumption whereby decentralization is a means of reduce governments sixe in order to stern its inefficient behavior.

Luiz de Mello theory (2002): It has been recognized that sub-national government have an important role to play in the implementation of public policies aimed at fostering social human development. The key argument for this remain that they are closer to the intended beneficiaries of public programmes. For this reason sub-national government are believed to be better equipped to extract information local preferences need more effectively than the central government to be accountable to local residents. With greater voice in the design implementation of public policies, local residents can also benefit from greater choice in the goods services delivery to them by the government.

2.5 Summary of Empirical literature and research gap

The review of empirical studies in the preceding section showed that several studies have been conducted to investigate the impact of fiscal decentralization on economic performance both in Nigeria and other countries. The summary of selected empirical literature review is presented in table 2.1. For instance, Udoh, Afangideli Udeaja (2015), using the autoregressive distributed lag (ARDL) bounds testing co-integration approach data for 1980 to 2012, examined the impact of fiscal decentralization on human resources economic growth in Nigeria. Akpan (2011) examined the impact of fiscal decentralization on social outcomes in Nigeria, using panel rom fixed effect procedures of the 36 states federal capital territory, Abuja. Gemmel et al

(2003) investigated whether the efficiency gain accompanying fiscal decentralization generalization generate higher growth in more decentralized economies, applying pooled mean group techniques to a panel set of 23 OECD countries from 1972-2005. Rodriquez-Pose Kroijer (2009) investigated the effect of fiscal decentralization in Eastern Europe using a panel data approach.

From the reviewed studies, it can be observed that no study so far in Nigeria has investigated the impact of fiscal decentralization on social sector development by examining the influence of fiscal autonomy on social sector indicators such as infant mortality rate, maternal mortality rate adult literacy rate. Also, from the review of empirical studies, no study so far has used fiscal autonomy to represent fiscal decentralization. These are departures from the previous studies the gap this study intends to fill.

Table 1: Summary of Empirical literature and Research Gap

S/N	AUTHOR(S)	TITLE OF THE PAPER	METHODOLOGY	FINDINGS
1.	Udoh, Afangideli Udeaja (2015)	impact of fiscal decentralization on human resources economic growth in Nigeria	Autoregressive Distributed Lag (ARDL) Bounds test to co-integration approach	long run unidirectional relationship exist amongst fiscal decentralization, human resource development economic growth.
2.	Akpan (2011)	impact of fiscal decentralization on social outcomes in Nigeria.	Panel Estimation Method	fiscal decentralization is consistently associated with lower mortality rate higher literacy rate
3.	Gemmel et al (2003)	Fiscal Decentralization Economic Growth:	Panel Estimation Method	expenditure decentralization tends to be

		Spending versus Revenue Decentralization		associated with higher level of economic growth
4.	Rodriquez-Pose Kroijer (2009)	Effect of fiscal decentralization in Eastern Europe	Panel Estimation Method	fiscal decentralization promotes higher efficiency, better public service, greater transparency eventually economic growth.

Source: Researchers compilation February, 2020

RESEARCH METHODOLOGY

3.1 Research design

This study adopted the quasi-experimental research design. This type of research design attempts to establish the cause effect relationship among variables. It entails examining the effect of one set of variables (the independent variables) on a set of other variables (the dependent variables). To achieve the aim of the study, this study shall make use of both the descriptive econometric techniques. The descriptive technique shall use simple descriptive statistics such as simple graphs measures of central tendency dispersion. The econometric technique to be adopted for the estimation is the panel estimation method, based on fixed effect models.

3.2 Model specification

The models for this study are anchored on eclectic base as they are rooted in the Luiz De-Mello (2002) Wallace-Oates (1972) theories of fiscal decentralization. In the theories propounded by De-Mello (2002) Wallace-Oates (1972), sub-national governments play a vital

role in the implementation of public policies aimed at enhancing social human development. The reason for this is that the sub-national governments are closer to the people than the central government hence in a better position to provide basic services to the people. Given the fact that sub-national governments are closer to the people, the citizens can benefit from the services provided by these government directly easily.

However, given that the provision of basic services such as education health care is a joint function of the central sub-national governments, then the ability of sub-national governments to provide these basic services depends on the level of fiscal autonomy of the sub-national governments. As expected, the higher the level of fiscal autonomy, the higher the ability of sub-national governments to provide basic services to the people. Hence, the main channel through which fiscal decentralization affects education health outcomes is an increase in the level of allocative and technical efficiency (Akpan, 2011).

The variables in the empirical models for this study are rooted in the fiscal decentralization theories developed by Luiz De-Mello (2002) Wallace-Oates (1972) but abstracted from Robalino et al. (2002) Akpan (2011) with slight modifications. The dependent variables for this study include infant mortality rate, maternal mortality rate, adult literacy rate. The independent variables captured include fiscal autonomy, health sector expenditure, and education sector expenditure growth in population.

On the basis of theoretical empirical exposition, the model for this study can be expressed functionally as:

$$IMR_t = f(FISA_t, HEXP_t, POPG_t) \quad 3.1$$

$$MMR_t = f(FISA_t, HEXP_t, POPG_t) \quad 3.2$$

$$ADLT_t = f(FISA_t, EDEXP_t, POPG_t) \quad 3.3$$

Where:

IMR = infant mortality rate, measured by the number of infant deaths per 1,000 live birth per states of interest in Nigeria.

MMR = maternal mortality rate, measured by the number of maternal deaths per 100,000 live birth per states of interest in Nigeria.

ADLT = adult literacy rate, proportion of adult population aged 15 above that is literate in Nigeria states of interest.

FISA = fiscal autonomy, measured by the ratio of internally generated revenue by the state government to fiscal allocation from the federal government to the state government.

HEXP = health expenditure by the state government in Nigeria (in millions of naira)

EDEXP = education expenditure by the state government in Nigeria (in millions of naira)

POPG = growth in population (in percent)

Equations 3.1, 3.2 3.3 can be expressed in an econometric form as follows:

$$IMR_t = \alpha_0 + \alpha_1 FISA_t + \alpha_2 LHEXP_t + \alpha_3 POPG_t + \varepsilon_{1t} \quad 3.4$$

$$MMR_t = \beta_0 + \beta_1 FISA_t + \beta_2 LHEXP_t + \beta_3 POPG_t + \varepsilon_{2t} \quad 3.5$$

$$ADLT_t = \delta_0 + \delta_1 FISA_t + \delta_2 LEDEXP_t + \delta_3 POPG_t + \varepsilon_{3t} \quad 3.6$$

Where: α_0 to α_3, β_0 to β_3, δ_0 to δ_3 are the parameters the study is seeking to provide numerical estimates to ε is the white noise error term. Expenditures on health education are expressed in log form, while infant mortality rate, maternal mortality rate, adult literacy rate, fiscal autonomy, growth in population are expressed in percent.

The expected signs of the coefficients of the respective parameters can be expressed as follows: $\alpha_1, \beta_1, \delta_1 > 0$; $\alpha_2, \beta_2, \delta_2 > 0$; $\alpha_3, \beta_3, \delta_3 < 0$;

3.3 Description of variables

Adult literacy rate: This is the proportion of adult population aged 15 above that is literate. A literate population is an educated population. Adult literacy rate is captured as indicator of education outcome effect of fiscal decentralization.

Infant mortality rate: This is the number of infant death under one year old per 1,000 live births in a given year. This variable is used in this study to indicate health outcome as a result of fiscal decentralization in Nigeria.

The Maternal mortality rate: This is the annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes). This is also used in this study to indicate health outcome as a result of fiscal decentralization in Nigeria.

Fiscal autonomy: This is the extent to which states in the federation are able to generate their revenue from various sources undertaking expenditure without wholly depending on the allocation from the federal government. The greater the level of financial autonomy of the states, the greater will be their ability to carry out projects in the health education sectors of the economy. We expect that an increase in fiscal autonomy should lead to an increase in literacy rate a decrease in infant mortality rate maternal mortality rate.

Health expenditure: This is government expenditure in the health sector in Nigeria. This is represented by actual budgetary spending in the health sector, measuring the level of government investment in the health sector. It is expected that an increase in government spending on health should lead to an increase in literacy rate a decrease in infant mortality rate maternal mortality rate.

Education expenditure: This is government expenditure in the education sector in Nigeria. This is represented by actual budgetary spending in the education sector, measuring the level of

government investment in the education sector. It is expected that an increase in government spending on education should lead to an increase in literacy rate a decrease in infant mortality rate maternal mortality rate.

Population growth: This is an annual percentage change in population in Nigeria. An increase in population growth put more pressure on existing infrastructures thereby requiring more government spending to smooth out the infrastructural deficit. An increase in population can affect negatively the amount of financial resources allocated to the various sectors of the economy, including health education. Hence, we expect growth in population to exert a negative influence on literacy rate a positive effect on infant mortality rate maternal mortality rate.

3.4 Data sources

The study will make use of secondary data sourced from panel survey of selected states in Nigeria from 2000 to 2019. The data will be collected from the Central Bank of Nigeria (CBN) statistical bulletins (various years), Central Bank of Nigeria (CBN) annual report statement of accounts (various years), National Bureau of Statistics (NBS) abstract of statistics (various years), publication of states bureau of statistics, actual estimated annual budgetary appropriation of the states, the World Bank Datasheet (Various years).

3.5 Estimation procedures

The study would pass through several estimation procedures before the final estimates will be obtain for analysis. A brief description of the estimation processes for this study is presented as follows:

3.5.1 Unit root test

The first step in the estimation procedures is testing for the stationarity conditions of the variables. The unit root test would be carried out to determine the order of integration of the

variables included in the specified equations. The stationarity test will be carried out using the Augmented Dickey-Fuller (ADF) test as well as Phillips-Perron 1988, (PP) test.

Therefore, employing the Dickey Fuller (1979) specification, the following unit root equation is estimated:

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \sum_{j=1}^{j} \beta_i \Delta y_{t-1} + \varepsilon_t \qquad 3.7$$

Where:

ΔY_t = the difference operation of y_t;

ΔY_{t-1} = the first difference operation of Y_{t-1}

e_t = Stochastic error term; α_0, α_1 β_i were the parameters to be estimated.

The decision is if $\alpha_1 = 0$, then the null hypothesis of non – stationary is accepted, but if $\alpha_1 < 0$ statistically significant, then the null hypothesis of non-stationarity is rejected.

Similarly, using the Phillips-Perron (1988) test, the following equation is also specified as:

$$y_t = \beta_0 + \phi y_{t-1} + \upsilon_t \qquad 3.8$$

Where:

β_o ϕ are parameters to be estimated; υ_t is the from error term.

The null hypothesis requires that if $\phi = 1$, then the series is non stationary or has a unit root but if $\phi < 1$, then the series is stationary.

3.5.2 Cointegration test

This involves testing of the presence or otherwise of the long run relationship among the variables in the specified equations. The general concept of co integration suggests that there exists equilibrium or a long-run relationship among non-stationary time-series variables, provided that the series is integrated of the same order. A lack of co integration suggests that

such variables have no long-run relationship amongst themselves. This means that they tend to very arbitrarily far away from each other (Dickey, Jansen & Thornton, 1991).

The study will employ the Johansen Juselius (1990) multivariate cointegration approach in investigating the existence of long-run equilibrium relationship among the selected macroeconomic variables in the specified equations. The vector autoregression model of order *p* (VAR (*p*)) is constructed as the following equation:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta y_{t-i} + C + \varepsilon_t \qquad 3.9$$

Where ΔYt is (n x 1) vector of macroeconomic variables in period t, μ is (n x 1) vector of constant terms, Γi (i = 1…k-1) represents the (n x n) coefficient matrix of short-run dynamics, Π is the n x n long term impact matrix, ε1t is (n x 1) vector of error term it is independent from all explanatory variables. The cointegration test is conducted using trace test maximum eigene value test.

The null hypothesis alternative hypotheses for the co-integration are stated as follows:

H_O: $B_i = 0$, indicating that there is no long- run relationship among the variables.

H_1: $B_i \neq 0$, indicating that there is long - run relationship among the variables.

The decision rule is that if the calculated trace maximum eigen values are greater than the critical values, then the null hypothesis of no co-integration is rejected it is concluded that there is existence of a long – run relationship among the variables in the model.

3.5.3 Panel estimation model

Panel data estimation method is a statistical method used mostly in social sciences, econometrics and epidemiology to analyze two dimensional panel data (cross sectional time series data). The data are usually collected over time individuals then a regression is run over these two dimensions. A typical panel data regression model can take the following form:

$$y_{it} = \alpha + \beta x_{it} + \varepsilon_{it} \qquad 3.10$$

Where: y is the dependent variable, x is the explanatory variable, α β are the coefficients to be estimated, i t represents indices of individuals time, ε is the error term. An important assumption about the error term depends on whether the regression model is a fixed effect or rom effect model. In the fixed effect model, the error term, ε is assumed to change non-stochastically over *i* t, which is analogous to a dummy variable model. In a rom effect regression model, the error term, ε is assumed to change stochastically over *i* t, requiring special analysis of the error variance matrix

3.6 Limitations of the study

The major limitation of this study is the inadequate data size to carry out robust examination of the matter under investigation. Data on internally generated revenue for the states federal allocation to states could be scanty and accessibility to them could be restricted too and only available from 2000. Hence, this short period of time is a significant limitation of this study.

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