

**AN ANALYSIS OF THE POVERTY-GROWTH –
INEQUALITY –NEXUS IN NIGERIA: 1992-2010**

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SEPTEMBER, 2016

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**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
DOCTOR OF PHILOSOPHY (Ph.D) IN ECONOMICS**

SEPTEMBER, 2016

APPROVAL PAGE

THIS THESIS HAS BEEN APPROVED BY THE DEPARTMENT OF
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DEDICATION

This work is dedicated to the Lord Jesus Christ for His divine wisdom, protection and provision and to my farther, late Mr. C. Iyoko.

CERTIFICATION

Iyoko, Nwamaka Evelyn a post graduate student in the Department of Economics with registration number PG/Ph.D/08/48562 has satisfactorily completed the requirement for the degree of Doctor of Philosophy (Ph.D) in Economics.

The work embodied in this thesis is an original work by the researcher and has not been submitted in part or full for any another Diploma or Degree of this and any other University.

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ACKNOWLEDGEMENTS

It is a dream come through. All glory to Almighty Farther, the God of the appointed time and the author of wisdom for leading me to the completion of this Ph.D program. He was there with me all through, making all my paths smooth.

The success of this research work was made possible through the contribution of people in different ways. I remain sincerely indebted to my supervisor, Prof. N.I Ikpeze for his fatherly advice and honest criticisms. Despite his tight schedule, he still found time to read through this thesis without delay. May God who rewards the secrete efforts of men openly andrichly bless you sir, reward you openly and grant you long life.

To my SOULMATE OgbeideOsaretin Friday, you are the BEST and a darling in a million. You took me just the way I am, and stood by me in love, encouragements and care. You were always there to wipe my tears telling me you can make it whenever I am at the edge of giving up from the heat of the constructive criticisms from the Board of the Department of Economics, UNN. I pray God will crown you long life to reap the fruit of your labour. To my Godly Children, God's Shelter and Divine, thank you for your understanding and patience. You are my pride and hope for future. God bless you, keep you for me and make you great even in my lifetime and after me.

My appreciation goes to the efforts of the Head of Department, Prof. (Mrs.) S. I Madueme, all the lecturers and postgraduate students, of the Department of Economics, University of Nigeria Nsukka for their directions and corrections that went a long way to bring out the best of this work. I am sincerely grateful to Dr. J. I Amuka, Dr. R. K Edeme, Dr. I. Ifelunini, Mr. J. Nchege, Mr. A. Ikem and Dr. E. Nwosu for their encouragement, advice and assistance received, I thank you all.

I remain indebted to my beloved Daddy, Mr. C. Iyoko for his fatherly advice and encouragement. He stood by me when it was cold and hot, I love you daddy. Special thanks to my siblings, Kelechi and Ikedi for their prayers, supports and encouragements. I love you all. Obi Ishioma deserves a special gratitude for her care, encouragement and moral support. She is a sister indeed. My in-laws; Mrs. J. Idemudia, a mother indeed, Mrs. M. Amayo and Mrs. A. Umeriyou are all wonderful.

I sincerely appreciate my wonderful friends at Samuel Adegboyega University; Mr. J. S. Omolekan my chief adviser, Roseline Jackson always there to hold my hands, Dr. M. Osemeke, Dr. C. Odil, Dr. B. Ngonso, Mr. K. Ola, Mr. D. Onyejiuwa, Mr. S. Ojukwu, Mrs. O. Agu, and Mr. O. Ebhote for their encouragement and moral support especially at the point of giving up.

Words are not enough to express my gratitude to Dr. (Mrs.) P. Ahamefule, Mrs. C. Ifionu, Mrs. V. Ishiwu and Mrs. F. Abada, women of virtue, for their love and assistance all through the period of this study. I pray God will bless you all and always provide helpers for you in your times of needs. I am highly indebted to Mr. D. O. Agu a vessel in the hands of God, who was the major instrument for the analytical part of this thesis. My special gratitude goes to Mr. C.U. Ugwu and Mr. R. Adu for all their assistance. I pray God to continually provide helpers for you. When you ask once, God will answer you seven times.

To my friends, Pastor A. Oluwayemi, Pastor F. Iraoyah, and Mrs. R. Usifo who stood for me in prayers, I pray God Almighty will refresh and pour His fresh anointing on you all. Also appreciated is the family of Mr. A. I. Osunde for their encouragement and moral support in the course of this research work, I pray God Almighty will always provide helpers for you.

ONCE AGAIN, TO GOD ALONE BE ALL THE GLORY

IYOKO, Nwamaka Evelyn

September, 2016.

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ABSTRACT

The issue of poverty is posing serious threat to the development of the Nigerian economy. Growth was seen as the driving force for poverty reduction by studies carried out in the 1980s. But, recent attention has now been shifted to the role of income distribution in reducing poverty since the yield of growth may not be equally shared and poverty not reduced. However, a distinct conclusion is yet to be established on the role of inequality in poverty reduction. Analysis on Poverty growth and inequality has received much attention among scholars, both in Nigeria and various other economies of the world. However, there seems to be a gap in literature on the flow of the triangle and the possibility of the previous levels of poverty, growth and inequality influencing the relationship of the triangle. Therefore, this research investigated the poverty- growth-inequality-nexus in Nigeria, using state data for 1992 to 2010 in a four year round panel framework. The study employed a dynamic simultaneous equation model while the Fixed Effect, Panel Least Square, First Difference Generalized Method-of-Moments and the System Generalized Method-of-Moments (GMM) econometric estimation techniques were used in the estimation of the model. The result from the study proved the System Generalized Method-of-Moments of estimation to be the best approach in analyzing the interaction among poverty growth and inequality in Nigeria rather than the other methods. The result of the empirical study revealed that growth is positively and significantly related to poverty and there was a negative and significant effect of income inequality on poverty. Poverty was found not to have any significant effect on growth and inequality. Poverty was positively related to growth and negatively related to inequality. The result of the study further showed that there is a positive feedback relationship between growth and inequality. States with high previous poverty levels tend to experience higher present levels of poverty and states with high previous levels of growth tend to experience higher present level of growth. The result of the study also showed that unemployment and literacy rates were critical determinants of poverty levels. Deliberate effort of the government in redistributing income is highly recommended to ensure poverty reducing impact of growth in Nigeria. Also, the need for unemployment reduction as a major part of policy measures aimed at poverty reduction in Nigeria is highly recommended for effective poverty reduction in Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The fight against poverty is now one of the main objectives of the development process. It is imperative to view its long-term effects and solutions given its relation with growth and inequality. This has raised the debate and broadened the spectrum of analysis on the poverty-growth-inequality interrelationships, with halving extreme poverty by 2015 constituting the first, and perhaps the most critical, goal of the Millennium Development Goals (MDGs). The major concern of world economy is on how to reduce poverty. Thus, ensuring that those in need get their share of the world's riches from the large amount of wealth created in the past century (Todaro and Smith, 2006).

There is no single definition of poverty. Poverty can be defined based on individual's perception under different circumstances. However, in a simple form, it is defined as a state of deprivation or lack of resources to meet basic needs. According to Todaro and Smith (2006), "the poor can be defined as the number of people living below a given minimum level of income—an imaginary international poverty line which recognizes neither national boundaries nor levels of national per capita income". Human Poverty is more than income poverty; it is the denial of choices and opportunities for living a tolerable life (United Nations, 1997).

Sen (1999) noted that poverty amid plenty is the world's greatest challenge. Poverty makes the people live without fundamental freedoms of action and choices. More than half of the citizens of the developing countries lived on less than \$1.25 a day in 1981 this has however, dropped to 21 percent in 2010. Yet, about 2.8 billion live on less than \$2 a day, and 1.2 billion live on less than \$1.25 a day of the total world population of about 7 billion. According to World Bank (2010), Sub-Saharan Africa countries have the highest levels of poverty and income inequality in the past three decades. About 500 million are poor out of its total population of about 877.6 million. Irrespective of the fall in poverty rate of 10 percent between 1999 and 2010, Sub-Saharan Africa is the only region that had a rise in number of poor individuals between 1981 and 2010. There were more than twice as many extremely poor people living in SSA in 2010 (414 million) than there were three decades ago (205 million). As

a result of this, Sub-Sahara Africa accounts for a third of the world's total poor population in 2010 as compared to the 11 percent of the world's total poor in 1981 (World Bank, 2010).

In 2006, out of the 50 nations on the UN list of least developed nations, 34 are in Sub-Sahara Africa. A more sobering statistics is that about 14.6 million children (simply, one in every five) live in absolute poverty as at 2007 data. As presented by the Human Development Report (2013) of United Nations Development Programme, human development index for the region was 0.475 in 2012 from 0.366 in 1980 which has been the worst since 1980 as compared to other regions. It has the lowest life expectancy rate of 54.9 and lowest mean years of schooling of 4.7. It also had the highest number of youths as well as the highest number of youth unemployment of 50 percent in 2012 and average youth unemployment of 12 percent over the period. The degree of poverty can depend upon two factors-the average level of income and the extent of inequality in income distribution.

Although growth is seen as the main drivingforce for poverty reduction, interest has nowbeen based on the role of income distribution in reducing poverty since the yield of growth may not be equally shared and poverty not reduced. A distinct conclusion is yet to be established on the relationship between equity and economic growth. The question at hand is whether countries should fight to stimulate economic growth usingmore robust economic incentives that lead to more inequality or strive to reduce inequality, enhance social stability, foster growth and reduce poverty.

From past studies, there are different effects considering rich versus poor countries, regions versus nations and cross section versus time series evidence. Garbis(2005) noted that initial thinking on the impact of inequality on growth is that greater inequality might be beneficial. This means redistribution of income that implies a trade-off of more growth for the price of more inequality. This ambiguouslyaffects the poor people.Inequality may limit growth at the nation level even when the increase in economic motivesadvances growth especially at the lower level, with high mobility of factors. It is a general impression among Economists that poverty seems to be high majorly as a result of the increasing income inequality.It is important that successful development strategies look at their interdependency andinteractions. Hence,Bourguignon (2004) refers to this relationship as the poverty-growth-inequality triangle.

1.2 Statement of the Problem

The policy that would help in the achievement of equity in distribution and alleviation of poverty had been an ongoing debate. Before now, the major debate was the professed trade-off between growth and inequality according to Kuznet's inverted U-hypothesis that suggested that inequality rises during the initial stages of development and then declines. Question has also been raised on the trickle down of the output of economic growth to the poor as proposed by early theories of development. However studies on different countries have shown that such a pattern cannot always hold for all countries (Deininger and Squire, 1996; Aigbokhan, 2000) and recent emphasis has been on explaining the rationale behind distinct experiences by different countries.

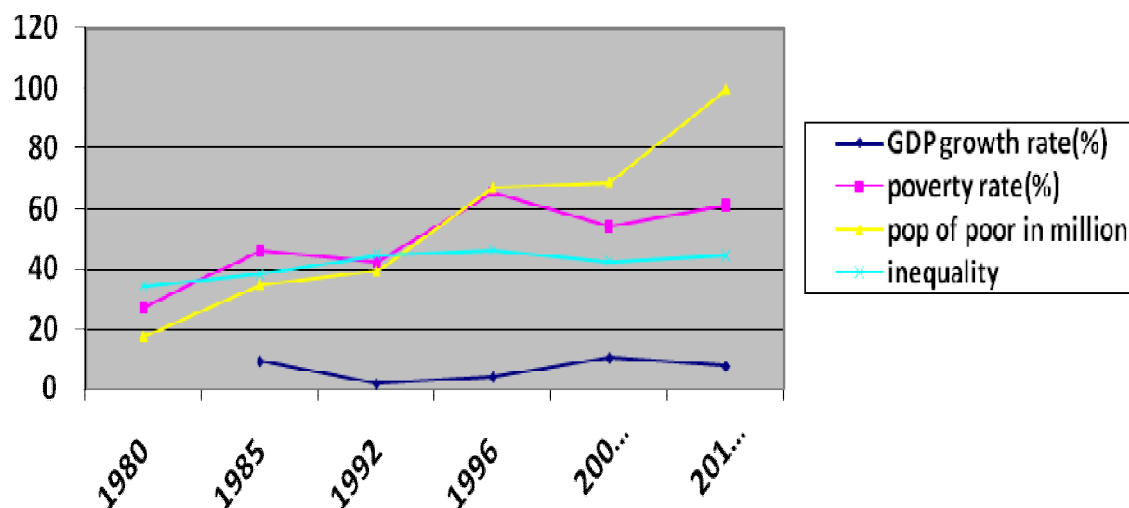
Nigeria's poverty situation is of a major interest. Statistical data attest to the growing incidence and depth of poverty in the country, and this presents a paradox considering the country's endowment of vast human and physical resources. The country is rich, but the people are poor (World Bank, 1996a, in Obadan, 1997). Irrespective of the fact that poverty reduction has been at the center of the country's economic policy and development programmes since independence with different targeted program (for instance, National Accelerated Food production Programme, Directorate for Food, Road and Rural Infrastructure (DFRRI), Better Life Programme, National Directorate of Employment, National Poverty Eradication Program (NAPEP), National Economic Empowerment Development Strategies (NEEDS) and Subsidy Reinvestment and Empowerment Programme (SURE-P)), using huge human and material resources and covering different sectors (agriculture, health, education, housing and finance), no noticeable success has been achieved in this direction. The poverty rate is still on the increase given an average of 5 percent per capita growth rate since 2000 (Ichoku, Agu and Ataguba, 2012). However, there are diverse views empirically on the impact of these programmes on the poor and poverty reduction. While some believe it has had positive impact (for example Obadan, 1994; Canagarajah, Ngwafon and Thomas, 1997), others opposed it (examples, Osinubi, 2003; Olaniyan and Bankole 2005; Ichoku et.al, 2012).

According to World Development Report (2015), Nigeria was amongst the low-income countries with GDP per capita of \$1700 in 2014. Similarly, the HDR (2013) ranks Nigeria 37th in terms of GDP, while on per capita GDP basis, it ranks 143rd. The HDR (2013) ranks Nigeria 30th on the basis of Purchasing Power Parity (PPP \$), and 150th on Per Capita Purchasing Power Parity (PPP \$). Its human development ranking is equally very low. Human Development Index (HDI) in 2011 puts it at 156th position among 177 countries as compared to

the 151st position in 2002, while its Gender Development Index (GDI) is at the 132nd position. However, Nigeria ranks 6th and 7th as oil exporter and producer, 10th as the most populous country in the world, 26th largest economy in the world and the largest economy in Africa (World Bank, 2015). According to UNDP HDR (2009, 2010), Nigeria's human poverty index (HPI) for 2007 was 36 percent placing Nigeria at the 114th position. Also in 2010, multidimensional poverty index was about 0.310 with about 62 percent poor multidimensional while World Bank (2015) rates Nigeria among the 5th poorest nations in the world as at 2014. Inequality is also very high with the ratio of the richest 10 percent to the poorest 10 percent of 16.3 and a Gini index for the nation of 42.9 in 2010 (UNDP, HDR, 2011).

Nwaobi(2004) observed that Nigeria's challenges are beyond enhancing one sector, State or region and the use of policies that lead to inefficiencies in resource allocation. It requires the adoption of policies that will improve the welfare of all living in it. According to the National Bureau of Statistics (NBS, 2012) and UNDP (2013), an estimated population of about 15 percent of Nigerian lived in poverty in 1960. The incidence of poverty based on \$1 a day increased sharply between 1980 and 1985 as well as between 1992 and 1996. However, there was a decrease in poverty level between 1985 and 1992, see figure 1.

Figure 1.1: Poverty-growth-inequality trends



Source: Authors chart using data from Central Bank of Nigeria, CBN, (2013), National Bureau of Statistics (2012) and Human Development Report, 2009, 2013

Figure 1 also shows that Real GDP growth rate followed the same trend as poverty increasing from 9.54 in 1985 to 10.48 2004 but dropped to 7.98 percent in 2010. Having rebased the

Nigerian GDP, the annual growth rate of GDP rose to 7.44 percent in 2014 (NBS, 2014). NBS (2012) estimated the incidence of poverty of most States in Nigeria in 2010 to be over 60.0percent. This means that over 60.0percent of their population is poverty stricken while some States have a very high incidence of poverty (for instance, Adamawa, 74.2; Sokoto, 81.2; Gombe, 74.2; Kastina, 74.5; Jigawa 74.1).The poverty incidence in the different States differs as a result the institutional components of the States. Per capita expenditure and the inequality are also on the rising side. Per capita expenditure increased continuously from N15.98 in 1985 to N1585.17 in 2007 and N2391.4 in 2010. Inequality rose continuously from 34.28 in 1980 to 46.50 in 1996, experienced a little drop in 2004 and increased to 44.96 in 2010 (NBS, 2006; Central Bank of Nigeria, (CBN), 2010). This has raised a question on the theoretical postulation of an inverse relationship between poverty and growth in Nigeria. To understand the nexus between growth, poverty and inequality is thus a major challenge both in research and policy debates.

Several studies have been carried out on poverty, growth and inequality ranging from measurement to analysis and empirical literature seems to lead to contradicting conclusions. A major feature of the relationship between growth and poverty that is often neglected is that there is no invariant relationship between the rate of growth and the rate of poverty reduction (faster growth is not always accompanied by faster rates of poverty reduction) (Epaulard, 2003) and the reasons for these variations are not yet fully understood. Thus, eliminating poverty in the shortest possible time requires an understanding of what lies behind these variations. Inequality has been found to play significant role in the poverty-growth-inequality relationship by some studies (Bourguignon, 2003; Epaulard, 2003; Kalwij and Verschoor, 2007), other studies have reached the decision that there is no deliberate and regular link between increase in growth and reduction in poverty because growth was found not to be enough in the reduction of poverty (Deininger and Squire, 1998; Fosu, 2009) while others demonstrated the existence of a relationship between per capita income growth and poverty reduction (Dollar and Kraay, 2002).

In Nigeria, some studies have been carried out on Growth and Poverty alleviation (see: Aigbokha, 1997, 2000; Bulama, 2004; Obadan, 1997; Obi, 2007; Ichoku et. al, 2012). Aigbokhan (2000) examined Nigeria's poverty profile and found that poverty is increased because of the existence of polarization in the distribution of income. The result of the study also showed that there is no existence of 'trickle down' experience; growth did not enhance

poverty and inequality reduction. The study of Bulama (2004) showed that poverty, inequality and economic growth correlate.

Tesliuc (2003) noted that most of these inconsistencies in these previous studies might be as a result of the methods used to evaluate poverty. It is also possible that inequality's impact on growth differs based on the economic setting. Past growth measures have been examined using nominal per capita expenditures and income data, as presented in official reports (Bulama, 2004; Obi, 2007). The use of real per capita expenditures as recommended by Boccanfuso and Kaboré, (2004) can mitigate conclusions on poverty trends and growth relationship. Bulama (2004) conducted some studies using Ordinary Least Square (OLS) method of which the stationarity of the data was not confirmed. These only gave a partial result since it was carried out on a partial analysis. Thus, a dynamic study is important in analyzing this nexus.

This study used a new methodology knowing that per capita expenditure changes over time. One possible indicator of pro-poor growth is the growth elasticity of poverty, that is, the percentage fall in poverty when the economy grows by one percent. As noted by Kurita and Kurosaki (2007), Kakwani (1993) shows that the elasticity to a counterfactual growth pattern that makes the entire Lorenz curve unchanged depends on the shape of the Lorenz curve and the location where the poverty lines fall on the curve. Kakwani, Khandker and Son (2004) and Heltberge (2004) examined this elasticity using current micro-dataset. These are different ways to show the changes that occur in the distribution. However, it is hard to infer the structural relationship among poverty, growth and inequality using these methodologies since the changes in poverty and those in average expenditure in the same period are linked by construction. It is, therefore, imperative to evaluate this nexus for Nigeria in a dynamic panel framework as recommended for future research by Alesina and Rodrik (1994) in their seminal paper in this field of study.

Hence, this study deviated especially from the most recent comprehensive study on the subject in Nigeria because it evaluated growth using real per capita expenditures. It also evaluated the poverty growth inequality nexus in Nigeria using measures of poverty and inequality data of the most recent survey in a dynamic panel framework. It is quite clear from the literature that growth alone is not enough to tackle the problem of poverty rather inequality may also be vital. Thus, meeting the goal of poverty reduction, for instance, may require special attention predicated on a better understanding of the poverty's growth's inequality nexus, particularly in Nigeria.

1.3 Research Questions

Given the Nigerian growth and poverty structure, the following questions therefore, became imperative:

- i. How is growth related to poverty in Nigeria?
- ii. Is poverty a significant function of inequality in Nigeria?
- iii. What is the relationship between growth and inequality in Nigeria?

1.4 Objectives of the Work

The broad objective of this study was the presentation of a dynamic analysis of the Poverty-Growth-Inequality Nexus, using Nigeria as a case study. Specifically, the objectives of the work are to:

- i. Analyze the relationship between poverty and growth in Nigeria.
- ii. Evaluate the statistical relationship between poverty and inequality in Nigeria
- iii. Ascertain the relationship between growth and inequality in Nigeria.

1.5 Research Hypotheses

Based on the above objectives, this research tested the following hypotheses:

- i. Poverty has no significant relationship with growth in Nigeria.
- ii. There is no significant relationship between poverty and inequality in Nigeria.
- iii. There is no significant relationship between growth and inequality in Nigeria.

1.6. Significance of the Study

The quest for poverty reduction is a pompous developmental concern in Nigeria. The country is faced with the major problem of a viable policy framework to achieve these objectives of poverty reduction and reduction of inequality in the face of high growth rate. There is also the problem of the possibility of a trade-off. Thus, if reducing inequalities brings quicker reduction in poverty, then distribution policy will take upper hand; and if it is growth that will bring down poverty fast, it will take the priority. This has led to different studies on the subject

matter with inconclusive results. This work contributes to the development of Nigeria economy and literature on this issue in two major ways:

First, it provided a deeper understanding of the Poverty-Inequality- Growth Nexus in Nigeria using the current survey and also proffers possible policy measures that accommodated the inequality growth trade-off in Nigeria for government and other stakeholders in the war against poverty. Knowing the status of a problem makes a problem half solved. Thus, the study brought out the structural relationship among growth, Inequality and poverty in Nigeria. This is of immense relevance to the poverty reduction developmental policies.

To test the theoretical hypothesis on the relationship among poverty, inequality and economic growth, the study used the system dynamic panel data model that allows researcher and policy makers to understand the dynamics and adjustments of economic variables. Dynamic panel data modeling has proved to be relevant and useful for understanding economic interactions between markets and agents in a complex world knowing fully that many economic relationships are dynamic in nature. It avails us the opportunity of exploring the cross-sectional and the time-series changes in growth and inequality as well as their impact on poverty.

Our research result is, therefore, expected to provide a quantitative policy framework to tackle the poverty and inequality problem that is eating up the economy. It is also anticipated to be an essential component in our efforts to establish the basis for long-term and sustainable development in Nigeria. It will give direction towards the combination of attention to income distribution and satisfaction of basic human needs in Nigeria. It also contributed to the existing knowledge and research in macro-micro-modeling.

1.7 Scope of the Study

The study analyzed the Poverty-Growth-Inequality Nexus in Nigeria using semi-macro panel datasets from National Bureau of Statistics and Human Development Report, Nigeria for different years. The study used data on poverty measured by head count index, growth measured by real per capita expenditure and inequality captured by Gini coefficient. Other variables are household size, adult literacy rate, unemployment rate and sources of water available to the people. The thirty-six States and Abuja constituted the cross-sectional scope while the period 1992 to 2010 using 1992, 1996, 2004 and 2010 formed the time series scope. The period used for the time series was chosen based on the limitation of data availability.

1.8 Limitation of the Study

This study is limited to the availability of recent data and had the most recent data available to be the General Household Survey 2010. It also had to make use of only four years round data as these were the only available periods of the national survey. The data for the study were obtained from different sources as only one source could not provide us with all the data needed for the study. The data used are as published in the various survey reports and other secondary sources that may also be prone to lack of perfect accuracy. The study also intended to compare the possibility of the impact of different measures of poverty and inequality, but this was not possible due to lack of data.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptualization Review

2.1.1 General Concept of Poverty

A clear and generally accepted definition of poverty is rare because poverty affects many aspects of the human condition, including physical, moral and psychological. Poverty is a multi-dimensional concept that involves not only material deprivation, but also includes denial of competence, lack of adequate protection as well as influences other institutions that affect an individual. Since the focus here is on economic growth, the material dimension of poverty is the primary concern, but not the only concern.

According to Longman Dictionary (1994), "poverty refers to a situation, state, experience or condition of being poor. It is characterized, among other things, by lack of material possession, existing without the luxuries and often the necessities of life. The individual is in a position to excite compassionate regard or pity, inferior in quality and having little distinction, value or worth." The UNDP defined poverty from its multi-dimensional nature as follows: "Poverty has various manifestations, including lack of income and productive resources sufficient to ensure sustainable livelihood; hunger and malnutrition; ill health; limited or lack of access to education and basic services; increased mobility and mortality from illness; homelessness and inadequate housing; social discrimination and social exclusion; it is also characterized by lack of participation in decision-making in civil, social and cultural life" (UNDP/National Human Development Report, 1996). Poverty is inseparably linked to lack of control over resources including land, skills, knowledge, capital and social connections (United Nations, 1996). In essence, poverty can be defined in terms of income poverty and basic needs (food, education, health care, and many more) poverty.

Income or Consumption Perspective: In this perspective, people are considered poor if and only if they lack enough income for a pleasurable well-being or standard of living. This approach is based mainly on monetary poverty (Bulama, 2004).

Basic Needs Perspective: This approach was developed principally by United Nations Children's Fund (UNICEF). It identifies certain important needs that are universal such as food, clothing and shelter that must be satisfied or fulfilled to keep people out of poverty. Poverty is, therefore, being defined as deprivation in the material requirement for minimally acceptable fulfillment of human needs including food (UNICEF, 1989). Table 2.1 presents a scheme of

poverty concepts. Moreover, available literatures on sustainable human development, which inform the subject of poverty alleviation, distinguish between three classes of poverty: absolute, relative and material (World Bank, 1990).

Table 2.1: Schematic Overview of the Concepts of Poverty

A: Concepts of Poverty

Conceptual Basis	Approaches		Indices
1. Poverty as a consequence of deficiency from the provision of goods	Absolute approach or conventional economic approach.		Consumer-oriented indices: income, achievable consumption level, food supply, medical care; basic needs: food, clothing, health and accommodation..
2. Poverty as a consequence of deprivation and lack of rights	Relative poverty, earning capacity, and entitlement approaches.		Income from wage labour, income from the sale assists, resources from own production resources (food). Social security claims, lack of rights or opportunities and the control of resources.
3. Poverty as a consequence of insufficient capability	Capacity approach		How goods are used (e.g. Markets for goods, products and labour) and benefits derived from goods, freedom and capability of transforming resources into a higher quality of life.
4. Poverty as a consequence of social and economic exclusion mechanisms.	Socio-economic exclusion mechanism based on the paradigms of solidarity, specialization and monopolization; vulnerability, and short-term shocks.		Participation in social, economic and political (E.g. democratic processes) development; net assets; investments, stores and claim.
Classification Basis	B: Typology of Poverty		
1. Basic Needs	1a. Absolute Poverty - Primary (absolute) poverty - Secondary (absolute) poverty		1b. Relative poverty - Objective relative poverty - Subjective, relative poverty
2. Individual Circumstances	2a. Conjunction/Transitory/Stochastic Poverty		2b. Structural Poverty
3. Microeconomic versus Macroeconomic	3a. Microeconomic Concept of Poverty		3b. Macroeconomic Concept of Poverty
4. Location	4a. Urban Poverty		4b. Rural Poverty
5. Nature of Society	5a. Generalized Poverty	5b. Island Poverty	5c. Case Poverty

Source: Adapted from Anyanwu, 1997

From Table 2.1, poverty is first classified using basic needs and this gives two types of poverty: absolute and relative poverty. Absolute Poverty relates to an individual's incapability to provide important necessities that he needs. Among these are; food, clothing, shelter,

portable-water, health service, education and public transport. This type of poverty leads to deprivation, nonparticipation in decision-making affecting one's life. Tregarthen (1996) defines an individual to be in absolute poverty if his or her income falls below a specific level. According to Schubert (1994), absolute poverty exclusively refers to the situation where individuals do not have any comparison being made between them and the others. It exists when the lives of those concerned are impaired by physical or social-cultural deficiencies. Absolute poverty can be primary or secondary absolute poverty. It is primary absolute poverty if physical human subsistence (expressed in terms of nutrition, clothing and housing) is not guaranteed while it is secondary absolute poverty if it refers to exclusion from participation in a normal way of life as compared to others (Anyanwu, 1997). Absolute poverty thus relates to poverty line expressed in absolute values. The poverty line is an annual income level that marks the dividing line between poor households and those that are not poor. It is derived from data on individuals and households consumption, where a cut-off threshold is laid down below which individuals and households are considered to be poor. According to World Bank Living Standard Measurement Survey (LSMS, 1997), the poverty line regards people as poor, if they survive on less than one Dollar per person per day.

Relative Poverty defines people as being poor if their income falls at the bottom of the distribution of income (Todaro and Smith, 2006). It is a situation where an individual or household's provision of goods is lower than that of other persons or households in a given area who are more closely specified. This does not mean that the person concerned cannot lead a life that is worthy of human dignity but it merely states that certain economic subjects are disadvantaged to an unacceptable extent because of the distributional structure in the society (Anyanwu, 1997). Relative poverty can be objective and subjective. Objective poverty shows differences in the individuals' satisfaction of basic needs or income values that are described by value judgment as excessive, not regarding the individuals' perception while subjective poverty is differences based on individuals' perception. Absolute and relative poverty is also seen from two perspectives: microeconomic and macroeconomic. In microeconomic terms, poverty refers to a situation in which individuals or households are not able to satisfy their basic needs to an inadequate degree while on the macroeconomic angle, poverty exists when the average inhabitants of a country live below the minimum subsistence level or not far enough above it.

Material Poverty relates to the lack of ownership and control of physical assets such as land and animal husbandry (UNDP, 1992). Poverty can also be chronic or transitory. It is obvious that transient poverty is more frequently found than chronic poverty in many parts of the developing countries. Distinguishing transient poverty from chronic poverty is essential because the type of interventions called for to alleviate each type of poverty differs. Chronically poverty is absolute poverty throughout the sample period while transitory poverty is poverty for some time. Reducing chronic poverty requires reasonable investment in human and health capital and some redistribution of assets- particularly land. McCulloch and Calandrino (2003) in Thorbecke (2003) distinguished three types of chronic poverty: a) mean consumption across time being below the poverty line; b) a high frequency of being in poverty over some time (or a high probability of being poor) and; c) a high degree of persistence in poverty. They defined total poverty P_i as the expectation over time of the poverty measured at each point in time P_{it}

$$P_i = E[P_{it}] \text{-----2.1}$$

Where:

$$P_{it} = \frac{(Z - Y_i)^a}{Z} \text{-----2.2}$$

y_i is the income of individual i

z is the poverty line

a represents the poverty aversion parameter in the FGT measure (Thorbecke, 2003).

Chronic poverty is defined as:

$$C_i = P(E[y_{it}]) \text{-----2.3}$$

Transitory poverty (T_i) is defined as total poverty (P_i) minus chronic poverty (C_i) (Thorbecke, 2003).

The poverty line helps to determine the depth and the incidence of poverty in any country. Poverty Rate/Incidence/Head Count is the estimate of the percentage of people living below the poverty line. The rate of poverty does not take into account any deterioration in living standard of the people thus it does not consider the depth of poverty. On the other hand, depth of poverty is usually measured as the mean distance below the poverty line, stated as a percentage of that line. It is also referred to as the poverty gap $\bar{y}$ showing the average distance from the poverty line. It gives a better picture of any deterioration in living standard. The statistical analysis of poverty situation divides the population into three mutually exclusive groups: the extreme (core) poor, the moderate poor and the non-poor. Two lines are set at one-third of the mean per capita household's expenditure and two-third of the mean per

capitahousehold expenditure. The extreme poor consist of those households below the lower line (i.e, one-third of mean per capita expenditure, the moderate poor are those between the two-third lines while the non-poor are those households above the two-third line. Using the depth, people who are far below the line are called extreme poor and those relatively closer to the line are called the poor.

2.1.2 Schools of Thought of Poverty

Two schools of thought exist in the analysis of poverty as has been concluded by researchers. They are Individual/cultural poverty and Structural/economic poverty.

Individual/cultural

The major proponent of this theory is Oscar Lewis in 1966. The theory believes that the individuals are the cause of their poor state. They are poor because poverty is in them, and their actions such as being lazy, not educated, teen parent, single female-headed family and many more make them unable to compete for economic opportunities. These attitudes of the individuals that made them poor becomes their way of life/ culture and they pass this on to their next generation leading to vicious cycle of poverty. This theory is, however, still controversial among poverty scholars and policy makers.

Structural/economic poverty

This theory believes that poverty is as a result of the structure of the economy. Among these factors are different employment levels and the nature of the distribution of income. Thus, an individual is poor not because he is not hard working but he lacks the opportunity to work. The economic system made the individual poor because of the inequitable distribution of income that denied him his share of the per capita income.

2.1.3 Inequality: A Concept

Inequality is defined as the unequal relationship existing among individuals or groups in a society as regard income, wealth, prestige, power, race or even sex (Kolo, 1999). He defined income inequality as the unequal distribution of income and wealth between the various members of the society. Bourguignon (2004) defines inequality as the disparity in relative income across the whole population after making all observations conform to a standard by the population mean so that they are independent of the scale of incomes. From the above definition, he identified two plain dimensions of inequality: Income inequality and Gender inequality. For the purpose of this study, we are interested in income inequality.

In the words of Marx (1868) in Bulama 2004, unequal distribution of wealth results from the unjust nature of the capitalist system. He further argued that this unequal distribution is what triggers tension, conflict and class struggle, which will virtually end up in a revolution. In like manner, Truett (1987) in Bulama 2004 also argued that inequality of income is the source of much unrest and perplexity in the society. He identified natural abilities, education and training, health and physical capability, industriousness, inherited wealth and market or population power as the various causes of income inequality.

Thompson (1986) identified four distinct classes in Nigeria based on income hold and wealth possession:

- i. The Bourgeois Class: This class consists of a relatively smaller percentage of the population but barely controls the greater proportion of the resources.
- ii. The Petty Bourgeois Class: This group consists of technical experts, bureaucrats, highly educated workers, consultants, well-connected lawyers, doctors and many more, who work closely with the bourgeois. This group also comprises some businessmen.
- iii. The Proletarian Class: This is a class that always multiplies in number but lacks access to the means of production and wealth. This class constitutes about 65 percent of the population.
- iv. The Lumpen Proletarian: This group relates to those who strive from hand to mouth. This class constitutes the bottom line of the class structure and is exposed to various forms of degradations.

2.1.4 Disparity of Income Distribution

The different measures of absolute poverty have to do with the distribution of income among the poor and not of the overall population. The most widely used measures are the Lorenz curve, the Gini coefficient and General Entropy class. The Lorenz curve is a graphical representation of the relationship between the cumulative shares of income (on the vertical axis). The horizontal axis shows the cumulative percentage of the incomes of the poor while the vertical axis represents the cumulative percentage of the poor population. Therefore, if the Lorenz curve of one income distribution, *X*, lies entirely above the Lorenz curve of another income distribution, *Y* (ie., all points on *X* lie closer to the 45 degree line than the corresponding point on curve *Y*), then, income distribution *X* is more equal than income distribution *Y*. That is, the income distribution of the poor represented by curve *X* is less unequal than the income distribution represented by curve *Y*. Also, if Lorenz curves cross then

the ranking of the distributions is indeterminate if one curve cannot be taken as superior to another in the sense of being more equal.

On the other hand, the Gini coefficient (G) measures income inequality based on the Lorenz curve. Symbolically, it is the ratio of the area bounded by Lorenz curve and the 45 degree line to the total area between the 45 degree reference line and the horizontal axis:

$$G = \frac{\text{Area between the Lorenz curve and the diagonal line}}{\text{Total area between the diagonal line and the horizontal axis}}$$

Where: $0 \leq G \leq 1$

It is also stated as $Gini = \frac{2 \text{cov}(Y, F)}{Y} \dots \dots \dots 2.4$

Where: Y is the income of the individual or household, F is the rank and Y is the mean income. Larger coefficient values indicate greater degrees of inequality. Thus, coefficients greater than zero suggest various degrees of income inequality while a coefficient value of zero shows an egalitarian income distribution. Unfortunately, like the Lorenz curve, the Gini coefficient provides only a partial ranking of income distribution and both indices neither indicate the number of people who fall below the poverty line nor the extent of impoverishment.

2.1.5 Poverty and Economic Growth

The economic performance and poverty levels theoretically has an inverse relationship (Gunderson and Ziliak, 2004). Growth is a prerequisite to poverty reduction, and theoretical evidence suggests that poverty could hamper sustained growth. According to Nabli (2013), it is estimated that a 10 percentage point drop in poverty levels, other things being equal, can increase economic growth by one percent. In turn, a 10 percentage point increase in poverty levels will lower the growth rate by one percent and reduce investment by up to eight percent of GDP. This is so because the poor are in no position to engage in many of the profitable activities that stimulate investment and growth, thus creating a vicious circle in which low growth results in high poverty and high poverty, in turn, results in low growth.

Changes in GDP, per capita income or per capita expenditure, measure the growth of an economy. An increase in GDP reflects increase in productivity, which leads to increase in output of goods and services. It is therefore believed that as the output of goods and services increases, employment and income rises, per capita expenditure and income increases, prices reduce and, ultimately, poverty is alleviated. The increase in GDP seems to be connected to reductions in poverty. This, therefore, explains the emphasis attached to growth as a panacea

for poverty eradication. This emphasis is expressed in Roswto's growth theory that postulates the gradual elimination of poverty within the societies as the economies grow. Growth in real consumption or GDP per person is satisfactorily associated with about 33-50 percent of the variance in the incidence and intensity of poverty. Moreover, more than 85 percent of cases where there is the data for changes in both growth and poverty over a period, there is usually an inverse relationship between them (Streeten, 1980).

The above assumed that growth is good for poverty reduction, or poverty reduction is good for speedy growth, but it explains only about half of it. Theoretical and empirical evidence has proven otherwise. Correlation is not causation, however, and there is no indication about which way the causation may work. Thus, as stated by Streeten (1980), 'growth is not an end itself, but merely a performance test or an indicator of development' When considered by itself, growth paints a very rosy picture of an economy outwardly but hides information on social indicators that are relevant to poverty. Townsend (1971) in Streeten (1980) asserts that 'growth is a measure of productivity rather than welfare. Thus, countries like the United States could provide living testimonies of falsity of the growth proposition; stressing that such country has the largest GNP per person but has neither the highest life expectancy nor the lowest infant mortality rate. By selecting GNP per person as the ultimate criterion of advanced development status, a distorted view of the world is presented.

The link between poverty and growth can be more obvious if poverty is implied as low income. It can then be argued that since poverty means low income, then a poor country is bound to necessarily record a sluggish or poor economic growth. This is simply because low income informs the low savings, which also leads to low level of investment and hence low level of productivity and national income. This chain reaction is magnificently exemplified by the Nurkse's vicious circles of poverty. Early growth theories, particularly those of Economists like Sir Roy Harrod and Evsey Domar, suggested that accumulated capital formation through savings is almost necessary for growth to take place. The HDM further asserted that the ratio of capital to output in an economy must be sufficiently enough to ginger economic growth. Thus, though growth is a necessary condition for alleviating poverty, it is, however, not a sufficient condition for poverty eradication.

2.1.6 Poverty and inequality

Burtless and Smeeding (2002) noted that the presence of inequality means there will be poverty because of their linkage. In fact, poverty can be reduced not only by increasing economic growth but also by improving income distribution (Bourguignon, 2004). A better income distribution helps people of the lowest income group to increase their income so that they can exit from their poverty. Addison (2007) noted that the life cycle analysis and permanent-income hypothesis are the important traditional economic theories explaining the regular form of consumption and income. However, they failed to explain the income inequality link. Becker in Addison (2007) argued that the utmost determinant of income is human capital. This significantly influences economic endowment of a man and his public expenditure on his children. Hence, the income of parents is a principal factor of later life income. On the contrary, Frank (1998) observed that given the absolute income of an individual, the relative position of the household in income distribution greatly affects the decision-making and level of inequality of the household. However, at the macro level, income distribution among the population significantly impacts on poverty and development (Addison, 2007).

Valentine in Bradshaw (2006) says that "the essence of poverty is inequality. In slightly different words, the basic meaning of poverty is relative deprivation. Two basic arguments on the debate of the link between poverty and inequality exist. One of the arguments believes that inequality leads to poverty. This is pragmatic school. The second is the moral school that argues that inequality is a type of poverty.

The pragmatic approach

Comparable international data since the mid-1990s have led to much cross-country studies examination of the effect of initial inequality on growth. The Majority of the studies (for example Persson and Tabellini, 1994 and Alesina and Rodrik, 1994) have found a negative significant impact of inequality on growth. This has led to some propositions as to why inequality should inhibit growth. These include capital market, imperfections, political economy considerations and social conflict. The causal link between inequality and growth probably goes in both directions, and there have been some challenges to the statistical results. Thus, the pragmatic approach believes that just as inequality is harmful to growth, inequality is certainly bad for poverty reduction at any level.

The moral approach

For the moral approach, inequality is sometimes seen as a form of poverty, and the capability approach to poverty shows that by definition, any society with inequality means that some people have less money, resources or power than others do. These people will often be described as 'relatively poor' but there are sometimes questions about whether they are 'absolutely poor'. From a purely financial perspective, they may even seem well off (Barber, 2008). This approach believes that poverty is concerned with human freedom and capability. Thus, all societies place some important value on equality, the international system of human rights, and many of the core moral and ethical teachings of the world's leading religions (Barber, 2008).

Barber (2008) also noted that disadvantaged children from families at the bottom of the wealth distribution do not have the same opportunities as richer children to receive a quality education. Thus, they are expected to earn less like their parents. They will also not be able to influence public decision and take part in political process if wealth is also related to political participation. Moreover, the cycle continues. This is known as the 'inequality trap'.

2.1.7 Inequality and Growth

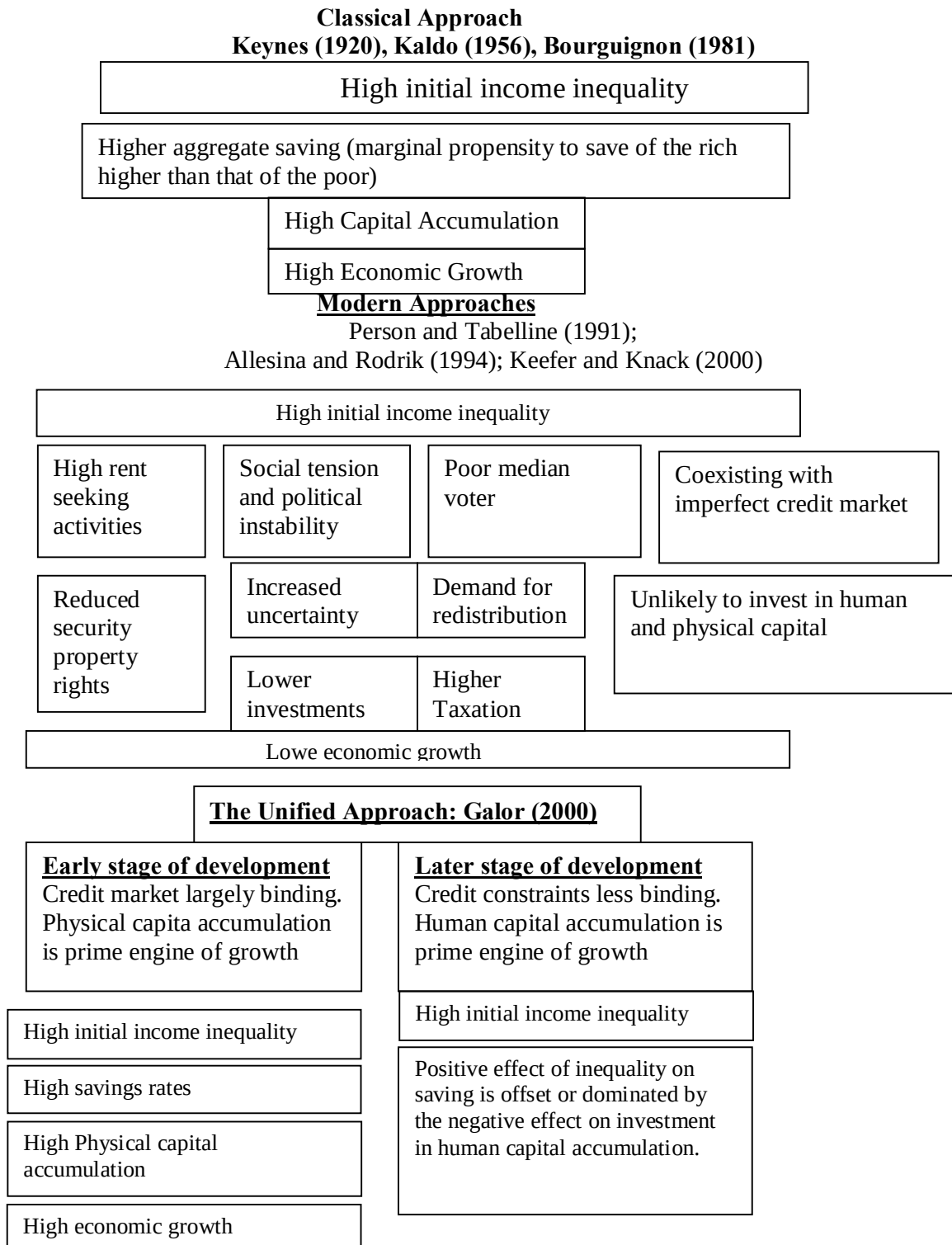
Much of the economic analysis has been strangely silent on the relationship between economic growth and income distribution. A relatively moderate theory which has prevailed in the mainstream academia for about half a century is attributed to Kuznets (1955), which argues that income inequality would change as economic growth changes or more precisely, income inequality would rise first and then decline with economic growth. This theory is related with factor movement between sectors where there is inequality, which permits income distribution and does not need to be fully equalized. This theory implies that fairer distribution may lead to higher productivity. A large body of theory, in essence asserts that high inequality in the distribution of income is a necessary condition for generation of economic growth. This was generally accepted in the 1960s through the early part of the 1980s in line with the Neoclassical counter-revolution such that attentions were drawn away from the problems of poverty and inequality (Todaro and Smith, 2006).

According to the Classical economic theories, there is a positive relationship between growth and inequality. Kaldor a Classicalist in Garbis (2005) argues that there is a higher marginal propensity to save among the rich than among the poor. Thus, a higher degree of initial income

inequality will yield higher aggregate savings, capital accumulation, and growth. Furthermore, the growth-enhancing effect of inequality is based on the existence of investment indivisibilities and incentive effects (Obwona, 2006). Edin and Topel (1997) linked inequality to growth-promoting factors such as entrepreneurship, innovation, and risk-taking. High personal and corporate incomes have been argued by basic economics to account for the large inequality in a country.

In addition to these, savings that make provision for investment and high capital accumulation also affect the level of inequality and hence, lead to economic growth as advocated by models like Harrod-Domar's model of Growth and Lewis's model. If the rich save and invest while the poor consume all their earnings, it will lead to greater growth irrespective of the inequality in the distribution of income and eventually, the high income would be redistributed through tax cut (Todaro and Smith, 2006). However, Kuznets in his write up warned that in developing countries, there are no guarantees that the higher income groups will save a significant proportion of their income in their own country. This portrays a trade-off where inequality is the price for growth. Figure 2.1 presents three different approaches of the channels through which income inequality affects growth.

Figure .2.1: Channels through which Inequality can affect Growth
Adapted from Garbis, 2005



Contrary to the above belief of the Classicalist, the new political economy/modern approach emphasizes that greater inequality reduces growth. This operates through the following different channels: (a) there will be low income and low levels of living for the poor. These are manifested in poor health, nutrition, fertility and education. It lowers economic productivity, thereby leading directly and indirectly to a slower-growing economy; (b) inequality in the societies is more prone to difficulties in collective action. These are possibly reflected in political instability, a propensity for populist redistributive policies, greater volatility in policies, greater uncertainty and lower investment. All these can lower growth; (c) the median voter in a more unequal society is relatively poorer and favors a higher (and thus more inefficient) tax burden; (d) inequality in income or assets coexists with imperfect credit markets. Poorer people may be unable to invest in their human and physical capital. This has adverse consequences for long-run growth (Garbis, 2005); (e) inequality in income encourages (unproductive) rent-seeking or illegal activities. This reduces the security of property rights, thus hindering investment and growth. The instability channel operates through the fact that a large group of impoverished citizens, facing a small and very rich group of individuals, demand radical changes. This leads to mass violence and illegal seizures of power that negatively affect the investment opportunities; (f) imperfect credit markets resulting in underinvestment by the poor, particularly in human capital.

Galor (2000) unified model provided an inter-temporal reconciliation for the above two conflicting approaches. Galor (2000) in Garbis (2005) argued that the classical approach holds at low income levels but not at later stages of development. In the early stage of development, inequality would promote growth because physical capital is scarce at this stage, and its accumulation requires saving. Inequality in income would lead to higher savings and rapid growth. Later in the economic development stage, however, human capital becomes the main engine of growth as the return to human capital increases given capital-skill complementarities. Credit constraints, however, become less binding as wages increase. The adverse effect of income inequality on human capital accumulation subsides, and as a result, the effect of inequality on the growth process becomes insignificant (Garbis, 2005).

2.1.8 Poverty, Growth, and Inequality: The Linkage

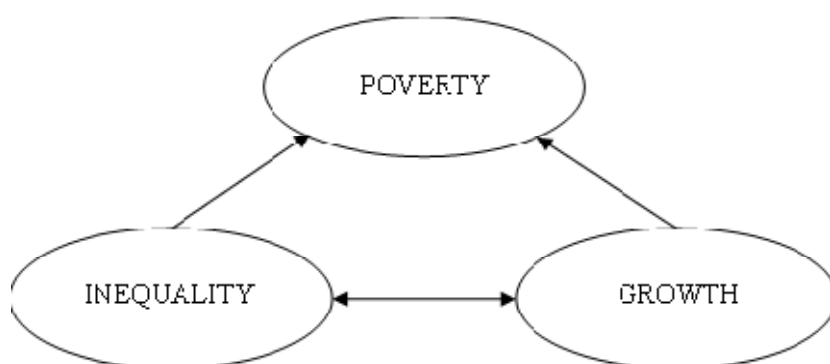
The discussion on development is mainly based on where the main focus of development strategies should be placed. Should it be on growth or poverty or on a decline in inequality? The general theory believed that economic growth will lead to decline in poverty

rates and by chance, a decline in income inequality (Feldstein, 1998). However, Feldstein (1998) again opined that if income inequality increases because of growth, Pareto principle will still hold provided nobody is made worse off even when others do not benefit from growth and there is an increase in poverty. But, higher initial inequality may result in lower subsequent growth and, therefore, in less poverty reduction. According to Poortman (2006), economic, political and social inequalities tend to trap disadvantaged people at the bottom of the society generation after generation. These do not only affect the people at the bottom, but it also hinders higher economic growth in the long run.

It is further argued that even if there is a strong relationship between GDP growth and poverty reduction, it might be the case that countries with initially high inequality may be less successful in reducing poverty. While earlier models, such as the Harrod-Domar model, predicted that greater inequality would lead to higher growth rates, during the 1990s, there was a shift in focus towards the opposite effect. The negative impact of inequality on growth may result from various factors. For example, access to credit and other resources may be concentrated in the hands of advantaged groups, in this manner preventing the poor from investing. High levels of inequality may reduce the benefits of growth for the poor because a higher initial inequality may reduce the share of the Poor's benefits from growth. Worsening inequality can mute the positive effects of growth on poverty reduction both in the short and long-run. It can also increase the risk of social alienation of people at the bottom of the income distribution, and perhaps produce counterproductive backlashes against further integration with the global economy.

An arithmetic identity links the growth of mean income of a given country with the changes in distribution and the reduction of poverty. Thus, the rate of growth of income of the people and level of equality in income distribution are major determinants of poverty reduction in a country (Bourguignon, 2004). Bourguignon illustrated this with the "Poverty-Growth-Inequality (PGI) triangle. The PGI triangle showed that it is important to consider growth and income distribution simultaneously and to recognize that income distribution is important as much as growth for poverty reduction. Bourguignon established the evidence showing that the connection is strong and concluded that changes in income distribution and growth may have large impact on changes in poverty.

Fig 2.2: Poverty-Growth-Inequality Triangle



Source: Adapted from Bourguignon (2004)

Poverty could be addressed either through growth or redistribution of income depending on their effectiveness for a particular country. To analyze the poverty-reducing impact of growth and redistribution, one can use a simple analytical framework that formulates two abstract possibilities, distribution neutral growth and redistribution with growth: first is the Poverty reduction through distribution-neutral growth (DNG). This supports a ‘trickle down’ under the most favourable conditions, in that there are equal percentage increases in income across the entire distribution. This implies an Index of pro-poor growth of unity. The second is the poverty reduction through redistribution of each period’s growth increment (redistribution with growth, RWG). This portrays an IIG (increasing inequality growth)/ IPPG (increasing poverty per growth) that is greater than unity. The growth of per capita income will thus worsen the distribution of income and poverty is unchanged. The enforcement of a particular target on the poverty agenda makes comparison policy-relevant. In the poverty-neutral policy framework ($IPPG < 1$), the possibility of growth with a worsening distribution of income common in most of the transition countries particularly during the 1990s (and China perhaps as early as the 1980s). Clearly, such a growth pattern would reduce the poverty-reducing potential of growth. It leads to transfer from the poor to the non-poor over the time and their consequences for poverty is clear (Bradshaw, 2006).

It should be recognized that higher levels of per capita income do not assure lower levels of poverty. Thus, it is important to understand the nature and distribution of income in analyzing poverty in any country. The incidence of poverty and unequal income distribution are not just the outcome of national economic growth process. They are dependent on the nature of that economic growth, as well as the political and institutional arrangements for distributing rising

national incomes among the broad segments of a population. Thus, in dealing with alternative policies to combat poverty, it is not sufficient to focus on raising growth rates of GDP and expecting a trickle down to improve the standard of living for the poor (Englama and Bamidele, 1997). The impact of growth on the poor obviously depends on how the benefits are distributed across the population.

2.2 Theoretical Literature

2.2.1 Growth Theories

The long run path of economic growth is one of the central questions of economics. Different models and theories have been put in place to analyze the path of growth. To explain why some countries grow more rapidly than others or why a country may grow more rapidly during one period of history than another, Economists have found it convenient to think in terms of a production function. This is a mathematical way of relating some measure of output such as GDP to the input required to produce it (Cornwall, 2014). The basic representation assuming only two factors of production is given as

$$Y = f(K, L) \quad (2.5)$$

Where Y is a measure of growth, K is the unit of capital used, and L is labour used

Classical Growth Theory: The modern conception of economic growth began with the critique of mercantilism especially by the Physiocrats and with the Scottish Enlightenment thinkers such as David Hume and Adam Smith as the foundation of the discipline of modern political economy. The theory of the Physiocrats was that productive capacity, itself, allows for growth, and improving and increasing capital allows an increase in capacity seen as 'the wealth of nations.' Whereas they stressed the importance of agriculture and saw urban industry as 'sterile,' Smith extended the notion that manufacturing was central to the entire economy (Cornwall, 2014).

Neoclassical model: This is one of the potential growth theories. The Neoclassical model is particularly appropriate to the developing countries. This model was developed by Robert Solow and Trevor Swam in the 1950s and was the first attempt to model long run growth analytically. The model is based on the belief that at any moment, an economy's potential output or supply is determined by the quantity and quality of two basic inputs, capital and labour, and the prevailing technology, within an aggregate production function. The Land is

treated as part of the capital stock because investment in its quality makes it unlimited. The aggregate production function takes quite limited algebraic forms, because it must conform to several necessary conditions: that countries use their resources efficiently, there are diminishing returns to capital and labor increases, no output is possible without at least one unit of each input (the function must be multiplicative, not additive) and, there is a constant ratio of the prices of the inputs that should be associated with a constant ratio of their physical use (a given wage-profit ratio implies a given labour-capital ratio).

If these conditions hold, the growth rate becomes the sum of the proportional changes in the two inputs. Each is weighted by a coefficient less than one (that ensures the operation of the principle of diminishing returns), plus the rate of technical change. The potential growth rate is rendered the actual rate through which perfect competition ensures no idle labour or capital. The wage rate and profit rate that result from the clearing of the input markets dictates the labour-capital ratio (which on the potential growth path is equal to the ratio of the aggregate supplies of the inputs). The rate of change of technology is considered exogenous in the simple version of the model. The growth of the labour force is treated as naturally determined, equal to the rate of growth of population if one ignores changes in demographic composition.

Bura (2012) noted that Solow took output as a whole as the only commodity in the economy. Its annual rate of production was noted as $Y(t)$ which shows the real income of the country where part of it is consumed and the other is saved and invested. The saved part is a constant s , and the rate of saving is $sY(t)$. $K(t)$ is the stock of capital. Thus, net investment is the rate of increase of this stock of capital, i.e., dk/dt or K . The basic identity is thus given as:

$$K = sY \text{-----} (2.6)$$

Since the output is produced with capital and labour, technological possibilities are represented by the production function.

$$Y = F(K, L) \text{-----} (2.7)$$

Given a constant returns to scale and inserting equation (2.6) in (2.5), we have

$$K = sF(K, L) \text{-----} (2.8)$$

In equation (2.7), L represents total employment.

Since the population is growing exogenously, the labour force increases as a constant relative rate n . thus.

$$L(t) = L_0 e^{nt} \text{-----} (2.9)$$

According to Solow in Chand (2015), n is Harrod's natural rate of growth where there is no technological change and $L(t)$ is the available supply of labour at a time (t) . The right hand side

of equation (2.9) shows the compound rate of the growth of labour force from period 0 to period t. Alternatively equation (2.9) can be regarded as a supply curve of labour. It says that the exponentially growing labour force offered for employment is completely inelastically. The labour supply curve is a vertical line, which shifts to the right in time as the labour force grows according to (2.8). Then the real wage rate adjusts so that all available labour is employed. Moreover, the marginal productivity equation determines the wage rate that will actually rule (Chand, 2015).

By inserting equation (2.9) into (2.8), Solow model gives the basic equation of

$$K = sF(K, L_0 e^{nt}) \text{ -----(2.10)}$$

He regards this basic equation as determining the time path of capital accumulation K that must be followed if all available labour is to be fully employed. It provides the time profile of the community's capital stock which will fully employ the available labour. Once the time paths of capital stock and the labour force are known, the corresponding time path of real output can be computed from the production function (Chand, 2015).

Solow sums up the growth thus: At any moment of time the available labour supply is given by equation (2.9) and the available stock of capital is also a datum. Since the real return to factors will be adjusted to bring about full employment of labour and capital, we can use the production of equation (2.7) to find the current rate of output. Then the propensity to save tells us how much of net output will be saved and invested. Hence, we know the net accumulation of capital during the current period. Added to the already accumulated stock this gives the capital available for the next period, and the whole process can be repeated (Bura, 2012). The rate of growth of capital is determined by the economy's aggregate saving rate. The assumption of perfect competition ensures that all saving becomes the investment, which by definition is equal to the change in the capital stock (Todaro and Smith, 2006).

From the above, the Neo-classical model makes three (3) important predictions: Increasing capital with respect to labour leads to economic growth because for a given capital, the people are more productive; investment in capital will produce a higher return and this will make poor countries with less capital per person grow faster than rich countries with ample capital; and because of diminishing returns to capital, economies will eventually reach a point at which any increase in capital will no longer create economic growth. This point is called a 'steady state'.

Harrod-Domar Model: The simplest framework for economic growth is the Harrod-Domar Model (HDM). The model attempts to show the relationship between the investment rate (ratio of capital investment to GDP), the productivity of investment, and the rate of economic growth (Iyoha, 2002). Every economy must save a certain proportion of its national income if only to replace worn-out or impaired capital goods (buildings, equipment, and materials). However, for the economy to grow, new investments which are net increase to the capital stock are necessary. The framework is based on the assumption that investment rate is determined by savings that can be foreign saving (net foreign financing), and domestic saving (in both the public and private sectors) (Bolnick, 2003). It employs a constant marginal Y/K (output-capital ratio), but not based on the problematical assumptions of constant real wages that yield a rising profit share of the Lewis Model.

The HDM is different from the Neoclassical model because it allows for an empirical differentiation between the potential (warranted) and actual rate of growth and as a consequence of this; it is possible to specify it to incorporate the possibility that growth is demand determined. The warranted growth path derives from the rate of investment, which determines the maximum increase in output that can be achieved when capital is fully employed. The achievement of the warranted path depends on the level of demand in the economy at any moment. Thus, the economy is demand determined in the HDM as applied to African countries but, contrary to the Neoclassical model where potential output is achieved through relative price adjustments (price determined).

However, early growth theories offered no clear explanation about the sources of productivity growth or technical change. Modern theories (Paul Romer and Robert Lucas Jr) in the late 1980s and early 1990s unsatisfied with Solow's explanation, economists worked to ñantagonize technology in the 1980s. These models incorporated a new concept of human capital, the skills and knowledge that make workers productive. Thus, recent growth models are focused on these vital components in their growth equation. These theories emphasize determinants such as knowledge externalities, Economies of scale in production, and the ñCatch-up effect. Knowledge externalities come from investments in recent machinery, production technology, information technology, education, and research and development, as well as direct experience (learning by doing) (Bolnick, 2003).

These investments have a diffuse, lasting and cumulative effect on efficiency throughout the economy. The importance of scale economies has been understood for centuries but was only recently incorporated into formal growth theory. For most production processes, this leads to larger scale yields, lower unit costs, higher productivity and greater competitiveness. This is the rationale for pursuing outward-looking strategies, with emphasis in low-income countries where domestic markets are very small compared to vast regional and global market opportunities. Finally, the catch-up effect indicates that poor countries have the best prospects for rapid growth. This is, however, ironic since most poor countries have not achieved rapid growth (Bolnick, 2003).

2.2.2 Vicious Circle of Poverty Theory

There are diverse theoretical perspectives on the causes of poverty. Among these are: the Vicious Circle of Poverty theory, the Power theory, Marxist theory, Classical theory and the Modern theory. However, for the purpose of this study, only the Vicious circle of poverty theory is relevant. Vicious circles of poverty are a circular relation of forces likely to act and react upon one another in such a way as to keep a poor individual or country in a state of poverty (Nurkse, 1995).

The vicious circle of poverty theory posits that poverty breeds poverty. The basic vicious cycle stems from the fact that in LDCs, total productivity is low due to deficiency of capital, market imperfections, economic backwardness and underdevelopment. The vicious circles operate both on the demand and supply sides of the economy. The demand side of the vicious circles exists in such a way that the low level of income leads to a low level of demand which, in turn, leads to a low rate of investment and hence back to deficiency of capital, low productivity and low level of income. Low productivity is reflected in low real income as shown in the figure below.

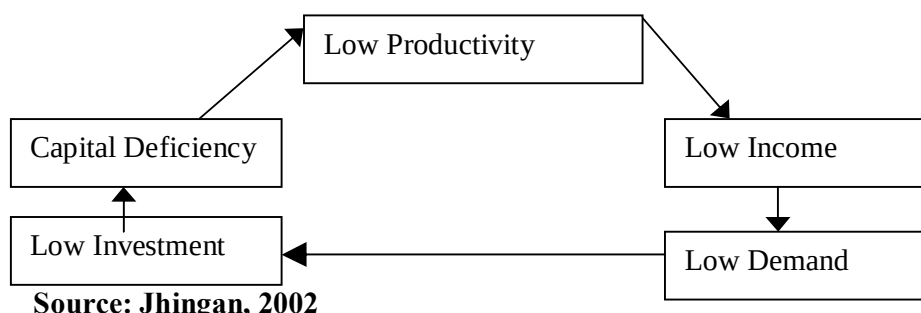
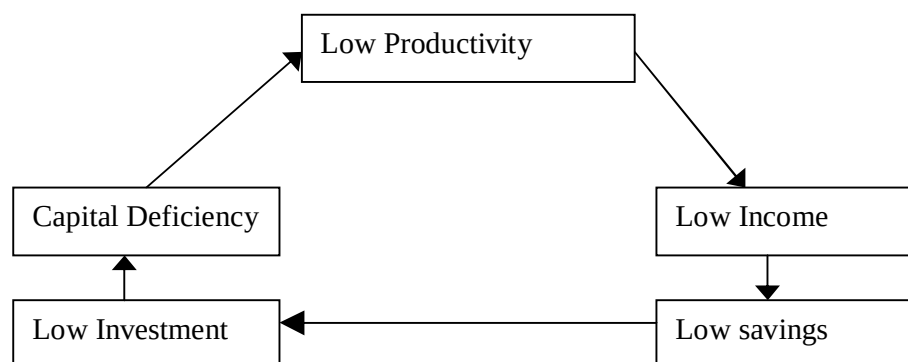


Figure 2.3a: Demand Side of the Vicious Circles of Poverty

The supply side of the vicious circles views low productivity to be reflected in low real income. The low level of real income means low savings that leads to low level of investment and deficiency of capital. The deficiency in capital, in turn, leads to a low level of productivity and finally to low income as depicted in the figure 2.3b.



Source: Jhingan, 2002

Figure 2.3b: Supply Side of the Vicious Circles of Poverty

According to Jhingan (2002), a third vicious circles envelope tends to under-develop human and natural resources. He further asserted that development of natural resources is dependent upon the productive capacity of the people in the country. If the people are backward educationally, lack technical skill, knowledge and entrepreneurial capacity, the natural resources will tend to remain unutilized or even mis-utilized. Poverty and underdevelopment of the economy are synonymous. Poor countries are underdeveloped and underdeveloped countries are poor and remain underdeveloped because they lack the necessary resources for promoting development.

2.3 Empirical Literature

2.3.1 Empirical studies in other continents

There is a dearth of literature on the relationship between poverty, inequality and economic growth since early 1980s. Before now, the debate has been on the link between growth and poverty reduction, on the one hand and between growth and inequality on the other hand with little or no consideration on the effect of inequality on poverty reduction. The debate on the inequality-economic growth remains unsettled. Empirical evidence from both industrialized and less developed countries has tended to confirm the negative impact of inequality on growth. Several recent studies (Dollar and Kraay, 2002; Kraay, 2004) have concluded that

inequality reduction has had little to do with reducing poverty in recent decades. Kraay (2004), reports that an overwhelming share of the change in poverty over time in his data set is explained by growth rather than by changes in distribution. However, there is yet very small empirical research available on the determinants of inequality in the world and Africa in particular as well as its interaction with economic growth and poverty. Conflicting empirical evidence has not helped, with contradictory findings in the face of different samples and econometric techniques, different measures of poverty and specifications and country peculiarities. However, some important empirical regularity has emerged from the studies.

De Janury and Sadoulet (2000) looked at the causes of changes in the rate of occurrence of poverty in the urban and rural areas as well as the Gini coefficients. They stressed the role of aggregate income growth using data of 12 Latin American countries between 1970 and 1994. They found that income growth reduces poverty in the urban and rural areas but does not reduce inequality. Growth in income was found to be more effective in urban poverty reduction given a low level of inequality and poverty with a higher secondary education. They showed that there is an asymmetry in the impact of growth on poverty and inequality, with a recession having strong negative effects on both poverty and inequality. They further argued that since inequality is not reduced with growth, a ratchet effect on the level of inequality is created by the economic cycles created. However, post-structural adjustment growth is quite effective at reducing poverty, particularly if inequality is low.

Attempt was made by Bourguignon (2004) to clarify the debate on the appropriate strategy for development. He examined the principles for the analysis of the relationship existing between the three vertices of the Poverty Growth Inequality (PGI) triangle. The result was in line with the equity-growth trade-off. Forbes (2000) found a positive relationship between inequality and growth using a fixed effect specification in a panel study that took care of the short and medium run relationship between the two variables. She argued that the use of different econometric techniques accounts for the different results.

Using the fixed effect and the Generalized Method-of-Moments (GMM) econometric estimation techniques for panel data, Garbis (2005) examined the empirical relationship between inequality and growth. He examined the impacts of growth, inequality, and government spending on poverty reduction. A new panel dataset was assembled on inequality and poverty that reduced measurement error and ensured comparability across countries and over time. He made use of an unbalanced panel of 82 countries from 1965 to 2003 and a

poverty indicator of \$1 a day of consumption or income at 1993 prices, adjusted for purchasing power parity (PPP). The results of the empirical study showed a positive effect of income inequality on growth and also confirm the Kuznets curve. The positive link was mainly attributed to the imperfection of the credit market in the developing countries.

Furquim and Garcia (2005) evaluated how related income inequality is to economic growth in Latin America. They employed a panel study first on 17 countries that was later reduced to 13 countries because four of the countries lacked complete data. The time span of the study was from 1970 to 1995. The validity of Kuznets curve was also examined while per capita GDP and growth rate equations were estimated using the neoclassical approach for economic growth. Human capital was proxy by average schooling age; income distribution was measured by the Gini index while per capita product of the countries and their growth was used as the dependent variables. The Ordinary Least Squares (OLS) and the Two-Stage Ordinary Least Squares (2SOLS) methods of analysis were employed. The result of the study was consistent with some other studies (for example, Forbes, 2000) showing a positive relationship between growth and inequality as well as the validity of Kuznets hypothesis.

Fallah and Partridge (2007) carried out a study to re-examine the linkage between inequality and economic growth. They noted that it is not surprising that past research uncovered conflicting findings because of different country specific factors. Using U.S data over the 1990s, the empirical results suggest that the econometric results are unstable when considering weighted regressions over the entire sample. In testing the Kuznets inverted-U hypothesis, they applied a modified version of the two alternative linear and reciprocal unconditional specifications of the inequality growth relationship. Consistent with their hypothesized relationships, when separately considering metropolitan and non-metropolitan samples, there was a positive inequality-growth link in the urban sample, with the opposite holding in the non-metropolitan case.

Kurita and Kurosaki (2007) made use of the system General Method of Moment estimation to empirically analyze the dynamics of growth, poverty and inequality. They incorporated the fact that the distribution of welfare indicator, say per capita consumption, changes overtime, and the empirical variables for growth, poverty and inequality are often compiled from the distribution of welfare indicator. The empirical model was applied to the dataset of the provinces in Philippines (1985- 2003) and Thailand (1988- 2004). This was compiled from micro data on household expenditures. The result of the analysis suggests that inequality

reduces subsequent growth rate of per capita consumption in both countries. The differences in equality showed the Philippines and Thai differences in growth and poverty reduction during the 1980s and 1990s.

Pieters (2008) used the 2002-03 SAM for India to examine the link between growth and inequality in India. The study examined how sectorial growth affects inequality in India. The SAM was based on India's National Accounts and the MIMAP-India survey conducted by the National Council of Applied Economic Research in Delhi, which reports per capita consumption expenditure and income for each household type. The results showed that demand growth in agriculture reduces inequality, while demand growth in heavy manufacturing and three largely public service sectors raises inequality, especially community, social and personal services. This was mainly because the skill-intensity and the skill premium in these sectors are higher than in the rest of the economy.

Teguh and Nurkholis (2011) examined the determinants of poverty dynamics in Indonesia. The study applied the spell approach of poverty experience and the ordered logit model to identify the poverty status of households: poor, transient poor (-), transient poor (+) and non-poor. Using a balanced panel dataset of 2005 and 2007 covering 8,726 households, they found that 28% of poor households classified as poor remained poor in two periods while 7% of non-poor households are vulnerable to being transient poor (-). The result of the estimation showed that the important factors of poverty dynamics in Indonesia are educational attainment, number of household members, physical assets, employment status, health shocks, access to electricity, and changes in the household size, in the working sector and in the microcredit program.

Phim (2011) examined the determinants of poverty; factors influencing household's consumption and food consumption in a panel of 827 households surveyed in 2001, 2004 and 2008 in Cambodia using fixed effect estimation. He used multinomial logistic regression to explore the factors that affect chronic and transient poverty. The result showed that assets, agricultural land size, irrigated land and access to microfinance institutions yield positive and significant impact on consumption while shock exerted a negative impact. He suggests that an increase in agricultural land size would decrease the possibility of being transient poor while an increase in irrigated land ratio would decrease the possibility of being chronic poor.

A further study on poverty in Cambodia was carried out by Tong (2012). He analyzed the key determinants of chronic poverty in rural Cambodia using four years panel data on 793 households collected during 2001–11. He made use of household wealth index (a proxy for long-term welfare) as welfare indicator. Both ordered logistic and multinomial logistic regression models were adopted on five explanatory variables: agricultural land and livestock, demography, human capital, social capital and natural resources. The findings of ordered logistic regression showed that the composition of household size, the education of the household head, social capital (i.e. connection with three or more people in the community), agricultural land and livestock are likely to be the most important factors that help the chronically poor to move into better off groups. Also, the multinomial logistic regression results showed that household composition, particularly the number of children aged 7–14 years and females aged 15–64 years, the education of the household head, agricultural land and livestock are crucial in reducing the likelihood of chronic poverty.

Balakrishnan, Steinberg and Syed (2013) assessed how pro-poor and inclusive Asia's recent growth has been as well as the determinants. They found that while poverty has fallen across the region over the last two decades, inequality has increased, dampening the impact of growth on poverty reduction. As a result, relative to other emerging and developing regions and to Asia's own past, the recent period of growth has been both less inclusive and less pro-poor. They thus recommended enhanced fiscal policies such as increased spending on health, education, and social safety nets; labor market reforms to boost the labor share of total income.

2.3.2 Empirical studies in Sub-Saharan Africa

Sub-Saharan Africa is one of the most poverty stricken continents, and several studies have been carried out to explore this nexus of Poverty-Growth-Inequality. Ali and Elbadawi (1999) carried out a study on inequality and the dynamics of poverty and growth and modeled the dynamic interactions between growth and distribution in the analysis of the behavior of poverty over time. The model permits formal analysis of the factors that led to the growth collapse as well as the rise in poverty in Africa and other developing regions, except Asia, during 1975–96 periods. Using indicators of average country performance (in terms of the rate of acceleration of growth, changes in poverty and extent of inequality), the model suggests tentative strategies for dealing with poverty which must include policies for accelerating growth as well as measures for more equitable income distribution.

Barro (2000) carried out a panel study of countries in Sub-Sahara Africa and Latin America. Result showed little overall relation between income inequality and rates of growth and investment. Higher inequality tends to retard growth in poor countries and encourage growth in richer places. The Kuznets curve emerges as a clear empirical regularity. He concluded that, this relation does not explain the bulk of variations in inequality across countries or over time.

Bigsten and Shimeles (2005) used simulations to explore the possibility of halving the percentage of people living in extreme poverty in Africa by 2015. A pro-poor growth-scenario and a constant-inequality scenario were compared. It was shown that initial levels of inequality and mean per capita income determine the cumulative growth and inequality reduction required to achieve the target. The trade-off between growth and inequality varies greatly among countries and their policy choices are thus quite different. In some cases, small changes in income distribution can have a large effect on poverty, while in others a strong focus on growth is the only viable option.

Thorsten, Asli, and Levine, 2004 used a broad cross-country sample, to distinguish among competing theoretical predictions about the impact of financial development on changes in income distribution and poverty alleviation. They made use of Ordinary Least Square (OLS) method of estimation and instrumental Variable regression to control for potential reverse causation and simultaneity bias. The result of the study showed that even when controlling for real per capita GDP growth, financial development boosts the growth rate of the poorest quintile's income. This suggests that financial development reduces income inequality by disproportionately boosting the income of the poor. Countries with better-developed financial intermediaries experience faster declines in measures of both poverty and income inequality.

Adopting the simple non-dynamic Computable General Equilibrium (CGE) model, developed by International Food Policy Research Institute (IFPRI) and those used by Cogneau and Robilliard, Israel (2006) carried out a study on the links between economic growth, poverty and income distribution in Ethiopia. To explore the impact of an increasing agricultural productivity on poverty and inequality, simulation exercises are performed. The mean income elasticity of the Foster-Greer-Thorbeck (FGT) poverty indices was also estimated to examine its poverty impact. Inequality effects were explored by estimating Gini index for rural and urban households using the Generalized Quadratic (GQ) Lorenz curve. The results show that increasing agricultural productivity would reduce both rural and urban poverty though the

former would benefit more. The rural household gets direct benefits through increase in income. Since poverty reduction is directly related with increasing income, the former has also reduced. The reductions in poverty, however, appeared relatively small. This was attributed to the negative indirect impact reflected in the reduction of agricultural products.

Fosu (2009) explored the extent to which inequality affects the impact of income growth on the rates of poverty changes in sub-Saharan Africa (SSA1) compared to non-SSA2, (24 SSA and 61 non-SSA countries) based on a global sample of 1977-2004 unbalanced panel data. The data was estimated using both the random-effect model and the country-fixed effect model. For both regions and all three measures of poverty – headcount, gap and squared gap – the study finds the impact of GDP growth on poverty reduction to be a decreasing function of initial inequality. The impacts were similar in direction for SSA and non-SSA, so that within both regions there were considerable disparities in the responsiveness of poverty to income growth, depending on inequality. Nevertheless, income-growth elasticity is substantially less for SSA, implying relatively low poverty-reduction sensitivity to growth compared with the rest of the developing world. Furthermore, the finding of the study uncovers a considerable variation in the predicted values of income-growth elasticity across a large number of SSA countries. This implies there is a need to understand country-specific inequality attributes for poverty reduction strategies to be effective.

Kabudo-Mariara, Mwabu and Ngeng'o (2013) analyzed the linkage between inequality, poverty and growth as well as assessing the extent to which growth in Kenya has been pro-poor. The study also explores the link between institutions, poverty and inequality. Macroeconomic data showed that economic growth in Kenya recorded an upward trend between 1994 and 1996 but dropped significantly in 1997 and a period of recovery was experienced till 2007. Poverty, however, increased during same period by 13% between 1994 and 1997, but declined by about 5% in 2005/6. Inequality also increased over the period, frustrating the impact of growth on poverty reduction.

2.3.3 Empirical studies in Nigeria

The issue of an analytical study of poverty came to fore in Nigeria in 1975, when the Nigeria Economic Society's Annual conference in that year focused on poverty. Since then, a lot of studies have been done on the issue but a majority of the studies have centered on the analysis

of poverty profile in Nigeria. Nevertheless, few empirical studies have been carried out on the issue of poverty in Nigeria. Obadan (1997) argues that economic growth may help to reduce poverty, in the long run, but it is not sufficient in itself to assist the chronically poor. He advocates the investment in human capital as a necessary pre-requisite to equip the poor and thus reduce poverty level in Nigeria.

In like manner, Aigbokhan (1997) investigated poverty and poverty alleviation in Nigeria. Using data for 1983/84 and 1991 and a micro data analysis which links a macro model to micro analysis, he found that inequality worsened during the period of the Structural Adjustment Programme being higher among rural areas. It was also discovered that inequality is higher among males in urban areas but higher among females in the rural areas. Further study was carried out by Aigbokhan in 2000 where the poverty profile in Nigeria was investigated in the face of structural policy reforms introduced in 1986 and the reversal introduced in January 1994. National consumer survey data sets for 1985/86, 1992/93 and 1996/97 from the Federal Office of Statistics were used applying the Food Energy Intake (FEI) variant of the consumption-based method in poverty analysis. This was a major departure from earlier studies that measured poverty based on percentile income/expenditure. The issue of polarization of income distribution was also investigated. The findings of the study suggest that there was evidence of increased poverty, inequality, and polarization in distribution during the 12-year period covered by the study. While polarization in income distribution increased between 1985 and 1992, it decreased slightly between 1992 and 1996. There was also evidence that poverty and inequality are indeed more pronounced among male-headed households, and in rural areas and the northern geographical zones. This corroborates evidence from other studies based on a different approach of defining the poverty line. A positive real growth was also found while poverty and inequality worsened through the period of the study. Thus, the trickle-down phenomenon that implies that growth improves poverty and inequality was not found. This may well be due to the nature of growth pursued and the macroeconomic policies that underlie it.

Further studies on poverty issues in Nigeria were carried out by Olaniyan and Bankole (2005). They presented an analysis of poverty in rural Nigeria with specific emphasis on the roles of human capital and capabilities. The analysis showed that poverty is common in rural Nigeria and those engaged in farming activities are poorer. Furthermore, the probit estimates emphasize the significant effects of human capital and capabilities in determining the poverty status of rural households in Nigeria. The findings of the study, therefore, suggest a conscious

effort at the policy level to redress poverty by increasing the human capita of individuals through the provision of adequate education to individuals particularly in rural areas. There is also the need to provide good social services, infrastructure and public goods because capabilities are a major part of poverty in Nigeria.

In addition to these, Bulama (2005) carried out a study on the relationship between poverty inequality and economic growth in Nigeria. The study used OLS methodology on Nigeria data for the period, 1980-2000 in determining the effect of poverty and inequality on growth. The existence of unsubtle correlation between poverty, inequality, and economic growth was found by the study. In addition, poverty and inequality showed a significant effect on the growth of Nigerian economy.

In the study carried out by Obi (2007), he examined the potency of fiscal policy as a tool for poverty alleviation. The study used a static real-side computable general equilibrium model examining three counterfactual scenarios. These are transfers to the poor household, targeting of government expenditure and import tariff adjustment. It was found that targeting government expenditure is a strong and effective tool for effective poverty reduction. Thus, designing fiscal policy to ensure that government expenditure is properly focused to ensure that goods required by poor households are provided was highly recommended by the study.

Bello and Roslan (2010) examined the poverty situation in Nigeria, given the economic growth and millennium development goals (MDGs) expenditure. The study employed a panel data analysis consisting of pooled model, fixed-effects, random-effects and weighted least square on the two-period panel data (1991 and 2006 National Consumer Survey (NCS) and National Living Standard Survey (NLSS)). The result revealed that there exists collinearity between the poverty rate and expenditures on MDG and that a unit increase in per capita GDP led to 0.6 % increase in poverty. Similarly, a unit increase in MDG expenditure led to 11.56 units increase in relative poverty in the pooled model, and was significant at 95% level. This result was compared to WLS model. The implication of the result was that economic growth and MDG spending has not substantially reduced poverty over the sample period. Thus, to minimize the poverty, the study calls for individuals, communities, stakeholders, policy makers, planners, government and international agencies to properly identify and target the poor via steering pro-poor programs not ad hoc measures as adopted previously. In addition, biometrics of the poor should be taken to allow proper poor tracking.

Ichoku et. al. (2012) investigated the pro-poorness of income growth in Nigeria using nationally representative data for 1996 and 2004. Total income growth in Nigeria was found not to be pro-poor as a result of the inappropriate redistribution of income and household size was found to be one of the critical determinants of poverty. Those in the agricultural sector were found to be more relatively worse off. They recommended that there was need for the adoption of smaller family size among other policies to reduce poverty in Nigeria. The agricultural sector should also be encouraged given that a large proportion of the population is in that sector. Region-specific policy should also be adopted in addressing the poverty issues in Nigeria.

2.4 Limitations of Previous Studies

There exists a plethora of research work on the issue of Poverty Growth and Inequality. The claims of these studies are largely concentrated on cross sectional analysis on developed and other developing countries with contradicting conclusions. Most of these recent studies have focused on the role of initial inequality in the impact of growth on poverty (Fosu, 2009; Bourguignon, 2003; Epaulard, 2003; and Kalwij and Verschoor, 2007). More so, only a few of these studies have critically carried out empirical analysis on the poverty growth inequality nexus on country specific basis.

For studies in Nigeria, no study has used the most recent available data to analyze the Poverty-Growth-Inequality Nexus using the system dynamic panel data model. This allows researchers and policy makers to understand the dynamics and adjustments of economic variables. Dynamic panel data modeling has proved to be relevant and useful for understanding economic interactions between markets and agents in complex modern economies knowing fully that many economic relationships are dynamic in nature using the current National survey result of 2010. Thus, this study filled the gap that has been overlooked by the literature on a country-specific basis and also bridged the methodological lacuna among researchers in this area.

CHAPTER THREE

OVERVIEW OF POVERTY GROWTH AND INEQUALITY IN NIGERIA

3. 1 Poverty Profile in Nigeria

The problem of poverty in Nigeria has been a cause for concern for a longtime to the government. Initial attention was focused on rural development, town and country planning as practical means of dealing with the problem. As such, the 2nd to the 4th National development plan documents contain both direct and indirect plans as well as objectives of policies and programmes aimed at minimizing the causes of poverty. The relative poverty rate or incidence in Nigeria covers about 70% of the total population. According to the UNDP Human Development Report (2009, 2011) and NBS (2012) more than 69% (i.e., about 112.47 million people) of Nigeria's total population lives below the poverty line.

Poverty trends and percentage of people living below the poverty line in Nigeria have been on the increase since the 1980s. Information from the National Bureau of Statistic (NBS) (Table 3.1 and fig 3.1) showed that the incidence of poverty increased sharply both between 1980 and 1985 and between 1992 and 1996. However, there was a decrease in poverty level between 1985 and 1992. It dropped from 46 per cent in 1985 to 42 per cent in 1992, and this translates from 34.7 million in 1985 to 39.2 million in 1992. This was largely attributed to the significant recovery of the economy that led to higher incomes. There was also higher household expenditure and real gains to a large part of the population (World Bank, 1996a in Obadan, 1997). The incidence of poverty was 28.2 percent, 46.3 percent, 42.7 percent, 65.6 percent and 69 percent for 1980, 1985, 1992 1996 and 2010 respectively. Dollar per day poverty as at 2010 is 61.2%. The 28.2 percent for 1980 translated to 17.7 million persons and 34.7 million persons in 1985. Despite the drop in poverty level in 1992, the proportion in poverty was about five million higher than the 1985 figure. By 2010, the population in poverty had increased sharply to 99.75 million poor using the Dollar per day as a measure of poverty, while relative poverty stood at 112.47 million (UNDP, 2009, 2011, NBS, 2012).

Table 3.1: Trends in Poverty Level (1980-2010)

YEAR	POVERTY LEVEL/RATE (ONE DOLLAR PER DAY)	ESTIMATED POPULATION TOTAL	POPULATION IN POVERTY
1980	27.2	65 M	17.7M
1985	46.3	75M	34.7M
1992	42.7	91.5M	39.3M
1996	65.6	102.3M	67.1M
2004	54.4	126.3M	68.70M
2007	64.4	142M	91.5M
2010	61.2	163M	99.75M

Source: 1 FOS Poverty Profile for Nigeria: 1980-1996 in Draft National Policy on Poverty Eradication (2000), in Nwaobi, (2004)

2 UNDP Human Development Report, 2009,2011

3. National Bureau of Statistics, HNLSS 2010 in Nigeria Poverty Profile, 2012

Fig 3.1:Poverty Rate and Population in Poverty in Nigeria

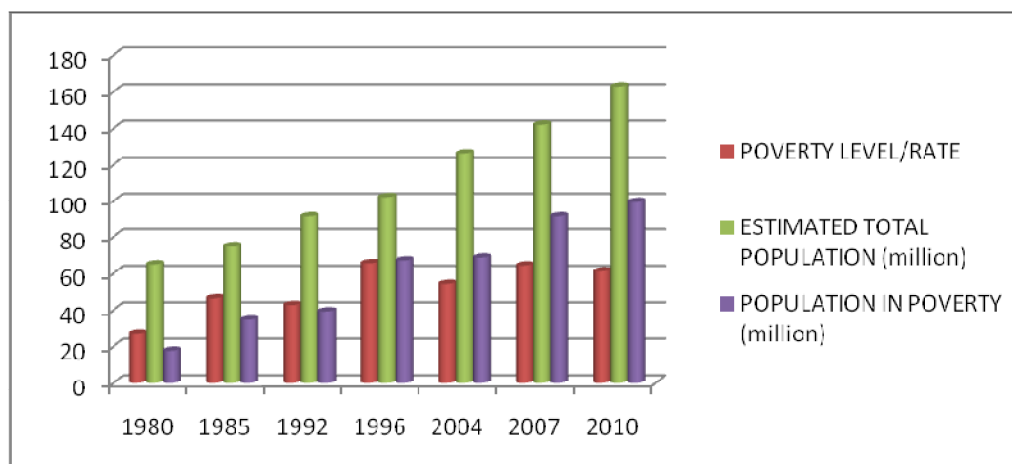
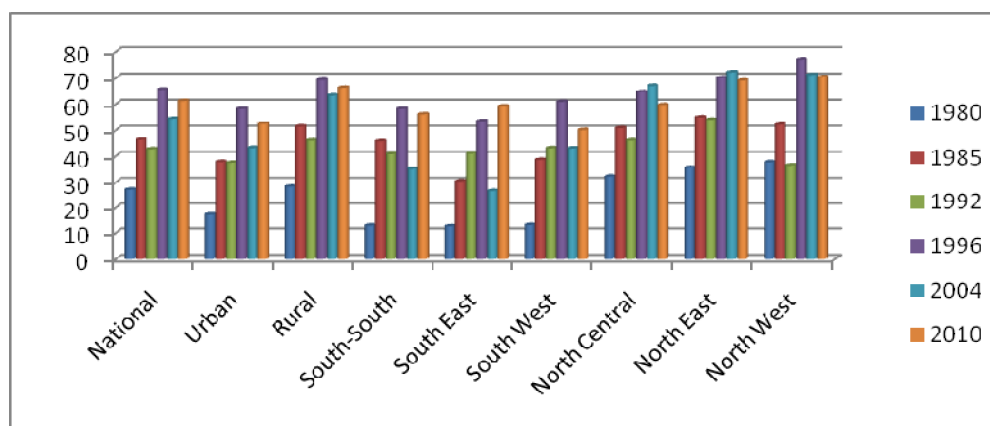


Fig 3.2: Incidence of Poverty in Nigeria by Zone and Residential Areas for the Year (1985-2010) (%)



The depth, incidence and severity of poverty in Nigeria have been rising over the years both at the national level, zones and the regions. NBS (2012) showed that the incidence of poverty has been higher in the rural area than the urban area and it has been higher in the northern zones than the south. For example, in 1992, 39.2 million Nigerians were said to be living in absolute poverty, out of which 80.2 percent or 32 million are in the rural areas. In 2004, 68.7 million Nigerians were in poverty of which 30.3 million and 38.4 million were located in urban and rural areas, respectively. Thus, about 65 percent of the poor lived in the rural areas while in 2010, 52.4 percent and 66.3 percent were poor in the urban and the rural areas respectively. This indicates that poverty in Nigeria is largely a rural phenomenon. The marginalization of the rural areas through urban-biased development policies is largely responsible for the high poverty incidence in the rural areas.

Record of poverty at the zones showed that while the south-east had an incidence of poverty of 26.7, the north-east had a poverty incidence of 72.2 in 2004. However in 2010, most of the southern zones had an increase in the incidence of poverty while the northern zone experienced a fall in the incidence. For instance, south east poverty level rose from 26.7 in 2004 to 59.2 while north east that had a poverty incidence of 72.2 in 2004 had poverty incidence of 69.1 in 2010 as shown in Fig 3.2. However, poverty incidence is still higher at the northern part of the country in comparison with the other parts of the country. The severity of poverty rose nationally from 7.9 percent in 1985 to 8.5 percent in 1992. Poverty gap was 0.0996 in the south east and 0.2743 in the north east while the severity of poverty was 0.0455 in south-east and 0.1434 in the north east in 2004.

The occupational dimension of the poverty incidence also shows that the agricultural sector is most affected. Over 67 percent of the extremely poor were in this sector in 2004, against about 31 percent in 1985, while sectors like professional and technical Administration had only 34 percent incidence of poverty in 2004. The rise in poverty in the agricultural sector in 1996 (71%) is explained by the abandonment of rural agricultural policies of the SAP period. Although there is relative decline in the percentage of poverty among people in the agricultural sector in 1996, there is still a concentration of poverty in the agricultural sector. This poses a very crucial challenge for poverty reduction because Agriculture continues to be the most important employer of labour and the predominant occupation of the rural and poor population (HDR, 2009).

The definition of poverty also covers the social services available and the accessibility of the services. This increasing trend of poverty further devastated the economy by exposing larger proportion of the population to become more vulnerable to the deadly virus such as the HIV/AIDS, especially due to lack of accessibility to medical facilities. UNDP Human Development Report (2015) noted that the incidences of HIV/AIDS in Nigeria have been on the increase, it stood at 3.2 percent in 2014 and this is resulting in high death rate and hardships. The severe and widespread poverty in the nation also did aggravate the trend in Nigeria's three mortality and reduced life expectancy. Table 3.2 showed that infant mortality in thousand (1000) births was 116 in the periods 1980-1990. This fell to 100 in the year 2007, 75 in 2009 but increased to 88 in 2012. The under-five mortality rose from 167 in 1990 to 187 in the year 2000 and 257 in 2007. It, however, fell to 157 in 2009 and ebbed lower to 117 in 2014 which is, however, still very high. Maternal mortality though was averaged 1250 between the periods 1990 and 2000, however, fell to 840 in 2009 and lower again to 814 in 2014. It shows little progress as the number of maternal cases increases day in day out. Equally revealing for the periods 1990 and 2007, the life expectancy at birth fell from 52 to 47.7. However, this increased to 52.8 in 2014. The number of physicians per 1000 people was 0.4 as at 2012 which are very low given the poor health status of the country.

Table 3.2: Nigeria's Three Mortalities as Indicators of Poverty

Years	1960	1970	1980	1990	2000	2007	2009	2012	2014
Infant Mortality Rate(per 1000 live births)	189	120	116	116	112	100	75	88	74.3
Under 5 Mortality Rate (per 1000 live births)	207	201	196	167	187	257	157	143	117
Maternal mortality Rate (100,000 live births)	1000	1000	750	1350	1000	1000	840	819	814
Life Expectancy at Birth	42.7	43.5	47	52	50	47.7	51.2	51.3	52.8

Source: UNDP, Human Development Report, 2000 And 2015

The level of education has not improved either; per capita real expenditure on education in 1991 and 1993 was merely 9 percent and 19 percent of what it was in 1975. The growth in the government expenditures on education have been more on the negative. For instance, in 1980, it was -30.0406; this experienced a positive growth rate of 37.26951 in 1990 and was on a single digit till 2010 with a growth rate of -19.0532. By literacy standard, Nigeria is relatively poor; the teacher- pupil ratio is worrisome. This rose to 1: 36 in 1990 from 1:34 in 1970, it dropped to 1: 27 in 1993, however, it rose to 1:37 in 1994 (Odusola, 1997). This also rose to 1:45 in 2007 and as at 2014; the ratio is 1:38 (National Economic Empowerment Development Strategies, NEEDS II, 2007, UNDP, 2015). Enrollment ratio is another index for measuring the

poverty profile in a country. Social indicators from the UNDP showed that primary school enrollment increased from 6 million in 1973/74 to 14.7 million in 1984/85, but in 2006, it had fallen to 12.5 million (NEEDS II, 2007). UNDP (2015) showed that in 2015, primary enrollment was 85 percent with 20.7 percent drop out, secondary enrollment was 44.0 percent, tertiary enrollment was 10.3 percent and trained teachers was 66.1 percent. In comparison to other low human development countries like Kenya, primary enrollment was 114 percent with 22.4 percent drop out, secondary enrollment was 67 percent, tertiary enrollment was 4.0 percent and trained teachers was 97 percent.

3. 2 Poverty and Economic Growth in Nigeria

From independence in 1960, pursue for economic growth has been assertively carried out. In the 1960s and 1970, agriculture was the spring board of economic growth for the country and this was aggressively done at the then different four regions. The sector provided employment for about 70 percent of the labour force. By 1970, the source of growth was moved away from agriculture to oil with the discovery of commercial quantity of oil in the country. Oil became the mainstay of the economy and growth was driven by oil exports. The economy transformed into positive growth in all the sectors from negative growth rates through the period 1980/86 and has been rising for the past three decades. Nigeria's GDP that was US \$60.6bn in 1980, dropped precipitously to US \$26.0bn in 1985 but increased to US \$160.7bn in 2005 and further to US\$264.2bn in 2013.

The growth rate of the real gross domestic product was very low before the 1980s. But, it grew from 3.0 percent in 1992 to 10.2 percent in 2003. This however dropped to 6.5 percent in 2005, but increased to 7.36 percent in 2010. The trend fell in 2011 and 2012, but started rising again to 6.90 percent in 2013 (UNDP, 2009, CBN, 2013). With the rebasing of the Nigeria GDP in 2014, the annual growth rate of GDP rose to 7.44 percent in 2014 (NBS, 2014). The rebasing has placed Nigeria as the Africa's largest economy from a position of N42.4 trillion naira (\$270 billion) to N80.2 trillion naira (\$510 billion). Nigeria is acclaimed to be one of the six fastest growing economies in the world having reportedly posted an average Gross Domestic Product (GDP) growth rate of 6% in the last decade. The rebasing of the GDP has changed the structure of the Nigeria economy. The economy appears to be driven now by the service sector which accounts for about 53 percent of GDP as against 29 percent of pre-rebasing, agriculture accounts for 22 percent as against 35 percent of pre-rebase while industry accounts for 25 percent compared to 36 percent pre-rebasing. Nigeria's share of world GDP was on the

increase from 0.3 to 0.7 in the period 1960 to 1985. It declined to 0.22 from 1990 but experienced a rise again from 2000 and as at 2013 Nigeria's share of world GDP was 1.5.

But this growth has not translated into household income and wellbeing, as it would be expected that the level of inequality and poverty would have improved over the years with the increase in the growth. The recent re-basing of the national accounts has brought further attention to this puzzle of the increasing growth and poverty in Nigeria. The major concern is how a country like Nigeria with this size have poverty rate higher than smaller countries such as Niger and Benin Republic? World Bank (2015) noted that Nigeria Economic Report provided evidence from the panel survey of 5000 households carried out in 2010/2011 and 2012/2013 as part of the General Household Survey of the Nigeria National Bureau of Statistics, that the per capital poverty rate of Nigeria is (Nigerian definition based on less than 3000 calorie-a-day consumption) is significantly lower than had been previously estimated.

A high tax-to-GDP ratio has been recognized as a tool towards the development of any economy because the resources will be needed in the provision of the necessities of development and poverty reduction such as the educational and the health sector. A tax-to-GDP ratio of below 15 percent is detrimental to the development of any economy while for developing countries, it should be at least 20 percent. The recent rebasing of the GDP has brought the tax-to-GDP ratio to 11 percent as against the 20 percent of the pre-rebasing. This will be a major obstacle to the effective pursue of development and poverty reduction in Nigeria (World Bank, 2015).

As depicted in Tables 3.3 and 3.4, per capita GDP in nominal terms and in 2005 PPP terms as measures of development have not been on the increase as the GDP. By year 2000, per capita GDP was only US\$706 in 2000, a 42 percent fall in PPP terms from its 1980 value. The per capita GDP in nominal terms and in 2005 PPP stood at 1118 and 1969 respectively in 2007 placing Nigeria on the rank of 135 and 141 while in 2015, the GDP per capital in nominal and PPP was 1700 and 5,423 placing Nigeria on the rank of 143 and 150 respectively. Pulling resources into the fight against poverty has taken lots of resources both human and material. This resulted in deteriorating economic performance, leading to a lackluster growth pattern and poor development in the face of high revenue from oil. The proceed from oil did not trickle down to the poor as it was not invested in productive things that will create job to reduce the unemployment rate and poverty rate in the country. With oil accounting for over 90 percent of exports and 80 percent of government revenue, it employs only about 2 percent of the

workforce. The key non-oil sectors recorded negative growth and agriculture, though still positive, recorded a significantly lower growth than in the 1970s. This can be expected to affect rural income as well as urban employment and income. The resulting consequence is an exacerbation of poverty and a higher rate of economic troubles, which manifested itself in different ways.

Table 3.3: Nigeria's GDP between 1980 and 2013

YEARS	GDP(in Billion US\$)	WORLD RANKING
1980	60.6	20
1985	26.0	21
1990	31.5	Na
1995	41.6	Na
2000	58.9	Na
2005	160.7	53
2010	360.8	46
2013	264.2	37

Source: UNDP, Human Development Report, 2009, 2013

Table 3.4: The Place of Nigeria in the Global World

INDICATORS	WORLD			NIGERIA			WORLD RANK	
	2007	2013	2014	2007	2013	2014	2007	2013
POPULATION(in M)	6.4	7B	7.3B	147.7M	162.5M	178.5	Na	156
GDP(in US\$Bn)	970	73,870,000		165.5	264.2		53	37
PER CAPITA GDP(US\$)	1215.3	NA		1118	1700		135	143
GDP in PPP(US\$ Bn)	1,517.05	87180	97,140	291.4	478.5	941.5	48	30
PER CAPITA GDP in PPP	1,901	13000	13,964	1969	2,800	5,423	141	150
HUMAN DEVELOPMENT INDEX(HDI)	Na	0.694	0.711	0.511	0.471	0.514	158	153

SOURCE: UNDP, Human Development Report, 2009, 2015
CIA World Factbook 2003-2013
World Bank 2013

The non-pro-poor economic growth, widespread poverty and low income, has made Nigeria to be characterized as a 'low savings economy'. Data showed that there is not only an extremely small capital stock but current rate of capital formation is also very low. According to the World Bank World Development Report (1998), Gross Investment from 1980-1997 was only 5 percent to percent of Gross National Income on the average, whereas in advanced economies it is about 15 percent to 20 percent. Such a low rate of savings is hardly enough to provide for a rapidly growing population at the rate of 2.83 percent per annum, let alone investment in new capital projects. The low level of savings and capital formation in the Nigerian economy undoubtedly led to low investment and poor capacity utilization. Capacity utilization in manufacturing, which was between 40 percent and 73 percent in 1980; 1985, fell to 36.4

percent in 1986. It, however, rose to 42 percent in 1987 and 44.5 percent in 1989. It steadily declined to 39 percent in 1990 and between 29.3 and 32.5 percent in 1994/96. It rose to 53.9 percent in 2009 and further to 55.4 in 2010 (Central Bank Statistical Bulletin, 2010).

In addition to this, the inappropriate policy measures culminated in worsening inflation in the economy. Inflationary pressures have persisted over the years irrespective of the different policy measures that have been implemented to check it. The inflation rate which stood at 7.4 percent in 1990 rose to 72.8 percent in 1995. It fell to 8.2 percent in 2006 and stands at 12.2 percent in 2011 (CBN, 2013). Although the trend has fallen, yet the country is still witnessing double digit inflation rate that is not favorable for growth. Low and declining capacity utilization implies falling employment and income, a widening income gap between those employed and those laid-off on the one hand, and a higher incidence of poverty on the other.

According to the CBN (2009) and NBS (2012), the unemployment figure for Nigeria in composite percentage terms increased from 1.8 percent in 1995 to 3.5 percent in 2007. It increased rapidly to a double digit in 2008 to 14.9 and 21.1 in 2010 based on the international labour organization estimates. Table 3.5 presents a more disturbing depiction of the unemployment situation in Nigeria.

Table 3.5 Selected Economic Indicators of Nigeria's Economy: 1985-2015

YEAR	MANUFACTURING CAPACITY UTILIZATION	REAL GDP GROWTH RATE (%)	INFLATION RATE (%)	UNEMPLOYMENT RATE (%)
1985	38.3	9.52	5.5	5.3
1990	39.0		7.5	3.2
1995	29.3	0.4	72.8	1.8
2000	54.37	5.4	6.9	4.7
2001	56.23	8.4	18.9	4.2
2002	54.02	21.3	12.9	3.0
2003	54.52	10.2	14.0	2.9
2004	51.62	10.5	15.0	2.8
2005	55.17	6.5	17.9	2.6
2006	53.96	6.0	8.2	2.9
2007	53.38	6.4	6.58	3.5
2008	53.50	6.0	15.0	14.9
2009	53.96	6.7	12.5	19.7
2010	55.83	7.98	11.8	21.1
2011	56.9	7.36	12.2	23.9
2013	Na	6.90	8.2	13.7
2014	Na	7.44	9.2	9.7
2015	Na	7.0	9.0	10

Source: CBN Statistical Bulletin, 2014; World Data Atlas, 2015

3.3 Poverty, Growth, and Inequality: Nigerian's Experience

An analysis of the Poverty, Growth and Inequality linkage in Nigeria will require an examination of the pattern of income distribution, poverty and growth trend in Nigeria. Poverty, inequality, and growth have all been on the rising trend contrary to theory. For example, in 1994, the distribution of aggregate household income shows that the bottom 40 percent of the Nigeria population received only 12.9 percent of aggregate household income while the top 20 percent received 49.3 percent of total household income. More striking is that while the top 5 percent of Nigerian families received 16 percent of aggregate household income, the lowest 20 percent received only 4.7 percent of aggregate household income (FOS, 1996). In 1996/97, the lowest 40 percent had 12.6 percent of the share of total income while the top 20 percent had 55.7 percent. Furthermore, in 2006/2007, the lowest 10 percent had 2 percent of the total income, while the top 10 percent had a share of 32.4 percent. The ratio of the richest 10 percent to poorest 10 percent in Nigeria stand at 16.3 percent and the Inequality Index measured by Gini Index stand at 42.9 in 2007 and 44.7 in 2010 although fell to 43.0 in 2014 as shown in Table 3.6 (UNDP HDR, 2009, 2015). The rebased GDP has amplified the perception of the inequality gap in the country. The agricultural sector that is expected to be used in the reduction of poverty given the large number of population it is absorbing is now expected to grow by 2.61 percent (World Bank, 2015).

To appreciate the magnitude of the impact of the rising poverty and inequality in the face of rising growth, we need to compare Nigeria with other developing countries like Egypt or Ghana. Egypt has an annual growth rate of 2.5 percent; the aggregate household income of the poorest 10 percent is 3.9 percent while the richest 10 percent has a share of 27.6 percent. The ratio of the richest 10 percent to the poorest 10 percent is only 7.2% and Gini index is 30.8 (UNDP, 2009, 2012).

Table 3.6: Comparison of Nigeria's Income Distribution and other Indicators with some Low Human Developing Countries as at 2014

COUNTRY	PEOPLE NOT EXPECTED TO SURVIVE TO AGE 40(%)	POPULATION WITHOUT ACCESS%			DISTRIBUTION OF INCOME			Annual Growth Rate 2000-2007	Gini Index
		SAFE WATER	HEALTH SERVICES	SANITATION	POOREST 10%	RICHEST 10%	RICHEST 10%/POOREST 10%		
Nigeria	37.4	53	48	55	2.0	32.24	16.3	7.1	43.0
Egypt	7.2	2	1	18	3.9	27.6	7.2	2.5	30.8
Kenya	30.3	43	48	6	1.8	37.8	21.3	0.5	47.7
Ghana	25.8	20	17	15	2.0	32.8	16.3	2.1	42.8
India	15.5	11	13	10	3.6	31.1	8.6	4.5	33.6

Source: UNDP Human Development Report (2009, 2015)

The widespread income inequality has led to the poor economic performance in Nigeria through its impact on poverty. For example, in the Table 3.6, it is clear that the number of people expected not to survive to age 40 stands at about 37.4 percent of the population, whereas in Egypt, the figure is only 7.2 percent and Ghana 25.5 percent. Furthermore, the high-income gap in the country leaves the majority of the people without access to health, water, security and sanitation. About 53 percent of Nigerians lack access to water, unlike Egypt where it is only 2 percent and 20 percent in Ghana. Also, about 48 percent of the Nigerian population lack access to health services, whereas in Egypt it is only 1 percent, and Ghana has only 17 percent. Further, in terms of sanitation Egypt has only 18 percent of its population without access, Ghana has about 15 percent but in Nigeria the figure is as high as 55 percent. This points to the fact that Nigeria is suffering more economic devastation than other countries classified as developing countries, majorly as a result of its high income inequality and accessibility to productive resources. These further exacerbate poverty and worsen economic performance and growth.

The effect of the Poverty-inequality levels in the country on the growth rate of the economy puts this out that there is a link between poverty, inequality and the economic growth of a country. Data showed that Nigeria's economic performance using all indicators was very poor compared to that of Egypt, Ghana or India. For example, Nigeria's per capita GDP (PPP US\$) stood at 1,969 as against 5,349 for Egypt. Similarly, in terms of weight, Egypt was weighted 17.1 only second to South Africa, but in the case of Nigeria it was weighted only 7.6, far below Egypt.

3.4 Poverty Alleviation Strategies Adopted by Government

Successive government over the years have formulated and carried out different policy measures, plans and programmes towards the alleviation of poverty in Nigeria. Among these are the National Accelerated Food Production Programme (NAFPP) formulated in 1972 under the administration of General Yakubu Gowon. It was focused on the peasant farmers to educate them, provide fund for agriculture and increase food production; the Nigeria Agricultural and Cooperative Bank (NACB) of 1972 that was aimed at financing peasant agricultural practices and Operation Feed the Nation (OFN) of 1976 which was channeled at educating farmers towards increasing food production. Others include:

Directorate for Food, Roads and Rural Infrastructure (DFRRI): This was established in 1986 under the administration of General Ibrahim Badamosi Babangida during the SAP era, to help in the coordination and to accelerate the pace of integrating rural development. This undoubtedly, provided the ground for agro-allied, small scale enterprises in rural areas. It also impacted positively on food production. However, the programme suffered from corruption, lack of standard for project harmonization and effective mechanisms for coordination among the three tiers of government and lack of technical depth in most projects which hindered the success of the programme.

Poverty Alleviation Programme (PAP): This was established in 2000 by Gen. Olusegun Obasanjo to solve the problem of rising unemployment, particularly among the youths. It was intended to increase the welfare of Nigerians, reduce the problem of unemployment, increase the productivity of the economy through increasing the adult literacy rate and to drastically reduce the wave of crime in the society. It employed measures such as increasing the salary of public sector workers, improving the supervisory capacity within the nation's institutions, reducing the avenues of wealth, encouraging and rewarding all deserving Nigerians for industry and enterprise and the launching of Universal Basic Education programmes. The programme was recommended to be discontinued after the 12 months first phase. The success of the programme was however hindered by factors such as payment of little attention to policy framework of funds allocation, uncoordinated management, over politicization of the programmes and majorly, there was lack of appropriate framework for targeting the beneficiaries.

National Poverty Eradication Programme (NAPEP): This was introduced in 2001, and was complemented by the National Poverty Eradication Council (NAPEC) which coordinates the poverty reduction related activities of all the relevant ministries, parastatals and agencies. NAPEP was aimed at providing strategies for addressing the manifestations of absolute poverty, and its eradication in the shortest possible time. This led to the establishment of four schemes: Youth Empowerment Scheme (YES), Rural Infrastructure and Development Scheme (RIDS), Social Welfare Service Scheme (SOWESS) and the Natural Resources Development and Conservation Scheme (NRDCS).

YES focused on capacity acquisition, mandatory attachment, productivity improvement, credit delivery, technology development and enterprise promotion. RIDS dealt with the provision of portable and irrigation water, transport (rural and urban), rural energy and power support.

SOWESS on the other hand focused on special education, primary healthcare services, establishment and maintenance of recreational centers, public awareness facilities, youth and student hostel development, environment protection facilities, food security provisions, micro and macro credit delivery, rural telecommunications facilities, provision of mass transit, and maintenance culture while, NRDCS focused on the harnessing of the agricultural, water, social mineral resources, conservation of land and space (beaches, reclaimed land, etc. particularly for the convenient and effective utilization by small scale operators and the immediate community (Okoroafor, et al, 2013). But, despite all the resources deployed to implement NAPEP since 2001, absolute poverty still persists in Nigeria. This programme was just characterized as being mired in bureaucratic bottlenecks and did not deliver its expected outcomes.

Economic Empowerment and Development Strategy (NEEDS) I and II: This was created in 2003 and it was rated as the first home-grown reform programme, which will lay a solid foundation for sustainable poverty reduction, employment generation, wealth creation, and value reorientation. It was aimed at the poor in the country by increasing access to health and education, increase in welfare of the people, provision of employment and security. It was aimed at restructuring the government to make it smaller, stronger, better skilled, and more efficient at delivering essential services. The NEEDS 1 document was found to lack programmes and projects which characterized a national development plan and was thus only a policy plan. NEEDS 11 introduced in 2008 was seen as a means of realizing the eight MDGs by 2015. Emphasis was placed on production, infrastructure, human resource development and strengthening the private sector. The program came out with mixed result. While there was improvement in real GDP growth rate, gross national saving and crude oil production, other areas such as infrastructure, power generation, unemployment, inequality worsened. The programme was found to lack effective monitoring and evaluation.

The Nigerian Vision 20:2020 Economic Transformation: This was established in 2009 as a long-term plan to stimulate Nigeria's economic growth and for rapid development. It was aimed that by 2020, Nigeria will have a strong, diversified and sustained economy among the top 20 economies in the world. It employed three tools among which are: guaranteeing productivity of the people and their well-being, ensuring that the key sources of economic growth are optimized and fostering sustainable social and economic development. This required an averaged growth rate of 13 percent. Although the re-basing of GDP has placed Nigeria as the 26th largest economy in the world in 2014 indicating a move along the

path of achieving the goals of vision 2020, but this has not been transformed into the wellbeing of the people given the high incidence of poverty in the country.

Subsidy Reinvestment and Empowerment Programme (SURE-P): This was a 3-4 year programme established in 2012 as a subset of the Transformation Agenda designed to mitigate the immediate impact of the removal of fuel subsidy and accelerate economic growth through investments in critically-needed infrastructure. It looked at areas such as Agriculture and Rural Development, Education, Health, Niger-Delta and Water Resources. Graduate Internship Scheme (GIS) was established in it to provide the unemployed youths with job apprenticeship opportunity and acquisition of skills that will enhance their employability.

CHAPTER FOUR

METHODOLOGY

4.1. Measures of Growth

The measure of welfare and growth of individual and households in most poverty studies focus on income or consumption expenditures measures, and there is ambiguity as to which of these indicators is a better measure of welfare. The use of income may be advocated because it gives better proxies for living standards, which are hard to quantify (Atkinson, 1991). It is also supported because it is believed that the welfare indicator should measure the opportunities for expenditures open to a family rather than expenditures per se (Atkinson 1991; Ravallion 1992). However, the income indicator of welfare suffers from some flaws. First, when measured over short periods, it may considerably understate or overstate the standard of living due to significant variations in income over time (for example, due to the seasonality of earnings). Second, income measures are expected to underestimate the true welfare because people sometimes underreport income or have difficulties in quantifying their earnings if they stem from self-employment and capital income (Atkinson, Rainwater and Smeeding, 1995).

Expenditures are often considered to be a better indicator of the general welfare (as households smooth their consumption over time) and to contain smaller measurement error compared to income. Expenditure data are more reliable and simple to compute than income (Deaton, 1997, Duclos and Araar, 2006). Deaton (1997) explained that income is often a more sensitive topic than consumption, especially since the latter is easier to see by friends and neighbors than the former. Moreover, estimating income requires knowledge of assets and profits; the estimation of both is a very difficult task. Thus, expenditure differential will be taken as a proxy variable for growth.

However, the relative merits of one measure over the other depend to a large extent on the economic and institutional environment of the country under study. In particular, income measures are considered to be quite problematic in less developed countries where much of the population is involved in non-market activities. Income in the less developed countries is subject to considerable seasonal variability because they are mainly derived from agriculture. In many empirical applications, the measure of choice in developed countries is income while in developing countries it is consumption (Ravallion 1992). Hence for the present study, per capita expenditure was used.

4.2. Estimation Framework

Analyzing poverty is mostly based on multivariate regression methods that attempt to identify the determinants of poverty at the household level, in a country or region using models of various structural relationships that affect poverty. One approach is to estimate a welfare function of a continuous measure of household welfare, such as income or consumption expenditures. Alternatively, poverty functions link household-related variables to a household-specific poverty indicator, defined on the basis of a poverty line (Appleton, 2001). The latter is a predetermined standard of well-being below which a person or household is classified as poor (Ravallion, 1992). Regardless of the definition of the poverty line, most commonly used dependent variables in poverty functions are binary indicators of poverty status or measures of the poverty gap. The theoretical and empirical literature reviewed above suggest that differences in regional or country experiences in poverty reduction may be attributable in a large part to disparities in economic growth and the initial level of inequality. There are many countries where growth may not adequately be translated into poverty reduction. The background study on the poverty growth inequality can be traced to Kuznets (1955). He argues that income inequality would change as economic growth changes or more precisely, income inequality would rise first and then decline with economic growth. Classical economic theories posit a positive inequality-growth relationship.

Given that growth is measured by real per capita expenditure for a state at a particular time t , (y_{it}), the rate of poverty being measured by the head count index (pov) and level of inequality measured by Gini index ($inequ$), the interdependency among these variables will not contribute much to the understanding of the dynamic mechanisms underlying poverty, growth, and inequality if we pick out one of them and regress it on the others, such as regressing the poverty headcount index (Pov_{it}) on the welfare level (y_{it}) and inequality ($Inequ_{it}$). Finding a negative effect of y_{it} and a positive effect of inequality on Pov_{it} from such specification cannot be interpreted as showing the structural relationships among poverty, growth and inequality (Kurita and Kurosaki, 2007). Our choice of particular measure of inequality and poverty was determined by convenience given the data problem in Nigeria since other measures can as well be chosen, although each measure may contain information not contained in the other.

4.3 Model Specification

In line with our objectives, one model was specified. The class of models that can be estimated using panel data can be written as:

$$y_{it} = \check{U}_{it} + b_i X_{it} + \varepsilon_{it} \quad (4.1)$$

$$\varepsilon_{it} = \varepsilon_i + \beta_t + \check{U}_{it}, \quad (4.2)$$

Where y_{it} is the dependent variable, and $\check{U}_{it}$ and X_{it} are k-vectors of non-constant regressors and parameters for $i = 1, 2, \dots, n$ cross-sectional units (here States) and $t = 1, 2, \dots, T$. time series unit; ε_{it} is a general disturbance, including a country, State or region specific unobservable effect, ε_i , a time specific factor β_t , and an idiosyncratic disturbance $\check{U}_{it}$. The fixed effects ε_i act as proxy for other determinants of a state's steady state not included in X_{it} and the time specific factor β_t controls for shocks common to all states.

For a dynamic panel data, the general model stated in its vector form is given as:

$$y_{it} = \check{y}_{i,t-1} + \varepsilon_{it} \quad ; \quad i = 1 \dots N; \quad t = 1 \dots T \quad (4.3)$$

$\varepsilon_{it} = \varepsilon_i + \beta_{it}$ with $\varepsilon_i \sim \text{IID}(0, \sigma^2_\varepsilon)$ and $\beta_{it} \sim \text{independent and identically distributed (IID)}(0, \sigma^2_\beta)$, independent of each other and among themselves. The X_{it} are assumed independent of the y_{it} for all i and t .

If exogenous variables are added to equation 4.3, our dynamic model takes the form of

$$y_{it} = \check{y}_{i,t-1} + b_i X_{it} + \varepsilon_{it} \quad (4.4)$$

With $\text{cov}(X_{it}, v_{it}) = 0$ for all $t = 1, 2, \dots, T$

From equation (4.4) above, to take care of the endogeneity posed by the endogenous-explanatory variables, the Generalized Method of Moments GMM was introduced. Here, $\check{y}_i$ was rather estimated as:

$$\check{y}_i = \check{y}_i + u_i \quad (4.5)$$

Putting equation 4.5 back into equation 4.4, we have

$$y_{it} = \check{U}(\check{y}_{i,t-1} + v) + b_i X_{it} + \varepsilon_{it} \quad (4.6)$$

Where $\check{y}_{i,t-1}$ and X_{it} are not correlated with ε_{it}

Applying this model for the study of the dynamic relationship among poverty growth and inequality in Nigeria, the model was applied for the 36 States and the Federal capital territory.

4.3.1 Model on the relationship among Poverty, Growth and Inequality

Model one was used to capture objectives one, two and three; to analyze the significant relationship among poverty, growth and inequality. This made use of the system dynamic panel data model specified as follows. The specification of model 1 follows Blundell and Bond

(1998), Yasar et. al. (2006), Kurita and Kurosaki (2007) and Gries and Redlin (2010). In period t , we observe $F_t(y_{it})$. As a result of unexpected shocks, denoted by vector X_{it} the distribution in the next period will be different from the current one. Thus, what we observe in the next period, $F_{t+1}(y_{it+1})$, is determined by $F_t(y_{it})$ and X_{it} . Fixing $F_{t+1}(y_{it+1})$ into the space of $F_t(y_{it})$ and X_{it} is the major concern of this model. However, characterizing this mapping is not possible since it is a mapping of one entire distribution into another, conditional on vector X_{it} . Instead, we estimated functions that associate parameters characterizing the current distribution with parameter characterizing the next period distribution, conditional on vector X_{it} . In other words, the basic idea for the empirical exercise in its vector form is:

$$y_{it} = \tilde{y}_{i,t-1} + b_1 X_{it-1} + b_2 X_{it} + \varepsilon_{it} \quad (4.7)$$

where: $t=1, 2, \dots, T$; $i=1, 2, \dots, N$; N is the number of states and T is the number of years. y_{it} is the vector of the dependent variable, X_{it-1} is the vector of the lagged endogenous explanatory variables, X_{it} is the vector of control variables added to the models while $\tilde{y}$, b_1 and b_2 are vectors of parameters to be estimated.

Left-hand side variables= vector of ry_{it} , $Ineq_{it}$ and Pov_{it}

Right-hand side variables= vector of X_{it} , ry_{it-1} , $Ineq_{it-1}$ and Pov_{it-1}

By estimating the system of equation, we can infer the structural relationships among poverty, growth and inequality. For instance, when we find a negative effect of $Ineq_{it-1}$ and a positive but less than unity effect of pov_{it-1} on Pov_t , we can interpret this as showing that a lower initial Gini coefficient increases the speed of reduction of the poverty headcount index. In the empirical application, it is likely that individual measures included in $Ineq_{it}$ are highly collinear with each other and that individual measures included in Pov_{it} are also highly collinear with each other. In the face of this, the following system of three equations will be estimated:

$$\ln ry_{it} = \lambda_1 + \beta_{11} \ln ry_{it-1} + \beta_{12} Ineq_{it-1} + \beta_{13} Pov_{it-1} + \theta_1 X_{it} + \alpha_1 + \eta_{1t} + e_{1it} \quad (4.8)$$

$$Ineq_{it} = \lambda_2 + \beta_{21} \ln ry_{it-1} + \beta_{22} Ineq_{it-1} + \beta_{23} Pov_{it-1} + \theta_2 X_{it} + \alpha_2 + \eta_{2t} + e_{2it} \quad (4.9)$$

$$Pov_{it} = \lambda_3 + \beta_{31} \ln ry_{it-1} + \beta_{32} Ineq_{it-1} + \beta_{33} Pov_{it-1} + \theta_3 X_{it} + \alpha_3 + \eta_{3t} + e_{3it} \quad (4.10)$$

Where $\tilde{y}$ stands for the unobservable and time unvarying characteristic of states, q_t represents unobservable macro shocks that affect all states in period t and e is an idiosyncratic error. In the theoretical model, X_t is defined as a vector of the variables that affect the distribution of the dependent variables. In the empirical specification, the vector is decomposed into X_{it} (observable factors), q_t (factors that are unobservable but that can be controlled for by utilizing the panel structure of the data set) and e_{it} (factors that are unobservable and that cannot be controlled for).

Following literature, the X_{it} variables which are the control variables used include; household size, unemployment (UNMP), adult literacy rate (LIT) and unimproved source of drinking water (INDW). Our equation 4.8 -4.10 can thus be specified as

$$\ln ry_{it} = \lambda_1 + \beta_{11} \ln ry_{it-1} + \beta_{12} Ineq_{it-1} + \beta_{13} Pov_{it-1} + \theta_{11} HHS_{it} + \theta_{12} UNMP_{it} + \alpha_{1t} + \eta_{1t} + e_{1it} \dots (4.11)$$

$$Ineq_{it} = \lambda_2 + \beta_{21} \ln ry_{it-1} + \beta_{22} Ineq_{it-1} + \beta_{23} Pov_{it-1} + \theta_{21} UNMP_{it} + \theta_{22} LIT_{it} + \alpha_{2t} + \eta_{2t} + e_{2it} \dots (4.12)$$

$$Pov_{it} = \lambda_3 + \beta_{31} \ln ry_{it-1} + \beta_{32} Ineq_{it-1} + \beta_{33} Pov_{it-1} + \theta_{31} HHS_{it} + \theta_{32} UNMP_{it} + \theta_{33} INDW_{it} + \theta_{34} LIT_{it} + \alpha_{3t} + \eta_{3t} + e_{3it} \dots (4.13)$$

Where:

$\ln ry$ = log of real per capita growth captured by the log of real per capita expenditure

$Ineq$ = Inequality measured by Gini coefficient.

Pov = Poverty measured by head-count index.

HHS = household size

LIT = adult literacy rate

$UNMP$ = unemployment rate

$INDW$ = unimproved source of drinking water

$i = 1, 2, 3, \dots, 37$ (ith cross sectional unit)

$t = 1, 2, 3, 4, 5$ (time series unit)

i denotes the cross-sectional identifier and t is time identifier.

We used $\ln ry_{it}$ instead of ry_{it} because the error terms become less heteroscedastic after the log transformation and also to remove the problem of outlier given the size of the data of ry_{it} as compared with other variables. Furthermore, the logarithmic form allowed us to compare our empirical results with those of existing studies. The control variables included in the different equations are based on previous studies and their relevance on the determination of the dependent variables in the given situation. In the growth model, there is theoretically a negative relationship between unemployment and growth. Unemployment reduces the productivity of the country that reduces the growth rate of the country. Also, household size captures the impact of population on growth. Given that we are using real per capita growth and not nominal growth, the higher the population at a given growth level, the lower the per capital growth which reduces the welfare level of the people.

Unemployment and literacy rate were used as a control variable for inequality and poverty. The higher the level of educational attainment of an individual, state and country, the more mobile the individual is. Also, the more the opportunity to get a higher paid job as compared to the less educated who are less mobile. This increases the welfare of the individual and reduces the probability of being poor. If the gap in literacy rate and level of educational attainment is

wide, they increase the rate of inequality within a given population. For instance, in Nigeria, primary school enrolment in some northern States is as low as 45 percent and as high as 95 percent in some southern States. People in urban areas also generally have greater access to a wider range of educational services than those in rural areas. So, literacy rate in urban areas is generally higher than it is in rural areas. Hence, the high rate of inequality and poverty between the northern and the southern regions as well as between the urban and rural areas. Households with larger sizes tend to be poorer than smaller households and the higher the availability of improved source of water supply the lesser the tendency of being poor.

In the equation (4.11) to (4.13), we investigated whether the growth rate is higher for States with lower initial growth by investigating whether parameter δ_{11} is between zero and one. In this sense, this parameter is analogous to the income convergence parameter (Jones, 2002). The difference in steady state of $\ln y_{it}$ is partially controlled for by fixed effects, $\check{U}_{1i}$. X_{it} not only controls for the difference in exogenous shocks that affect the entire distribution of real per capita expenditure, inequality and poverty, but also controls for any potential difference in the convergence speed attributable to observables. Also, given that the parameter δ_{22} is between zero and one, the closer it is to one the higher the inequality, but the closer it is to 0, the lower (less serious) the inequality. Thus inequality tends to decline in States with higher initial inequality, analogous to the inequality convergence (condition of constant or increasing differences) found by Ravallion (2005).

In our specification, parameter δ_{21} captures the effect of lagged inequality on growth. If it is negative, this indicates that States with higher initial inequality grow more slowly. However, our specification is different from the one used by Banerjee and Duflo (2003), who showed that the growth rate is a nonlinear (inverse U-shaped) function of a lagged change in inequality. In the correlation analysis, if inequality and growth are positively correlated, growth benefits more the not-so-poor than it does the poor. In this case, some of the gains from growth for the poor could be lost due to rise in inequality. Hence, the impact of growth on poverty would be lower than it would otherwise be (e.g., Bourguignon, 2004). We also compared the determinants of growth, inequality and poverty in equation 4.11, 4.12 and 4.13 with those derived using the specifications of a Panel Least Square, fixed effect, and random effect. The Panel Least Square model is thus given as:

$$\ln ry_{it} = \alpha_{11} + \gamma_1 \ln ry_{it-1} + \gamma_{12} \ln eq_{it-1} + \gamma_{13} Pov_{it-1} + u_{1it} \dots \dots \dots (4.14a)$$

$$\ln eq_{it} = \alpha_{21} + \gamma_1 \ln ry_{it-1} + \gamma_{22} \ln eq_{it-1} + \gamma_{23} Pov_{it-1} + u_{2it} \dots \dots \dots (4.14b)$$

$$Pov_{it} = \alpha_{31} + \gamma_1 \ln ry_{it-1} + \gamma_{32} \ln eq_{it-1} + \gamma_{33} Pov_{it-1} + u_{3it} \dots \dots \dots (4.14c)$$

Pov, lnry, and lneq are as defined above and u_{it} s are the combined time series and cross-sectional error components. The control variables of the different equations are same as presented in equations 4.11-4.13 above.

4.4 Estimation Method

The system of equations 4.11-4.13 has a lagged dependent variable on the right hand-side thus, we need to control for any bias that may arise from the model, known as the dynamic panel data (DPD) structure. As noted by Kurita and Kurosaki, (2007), an Ordinary Least Squares (OLS) regression, fixed effect or random effect estimates could be used in estimating our model, but this may lead to problems of reverse causality. Most studies have employed the pooled OLS, fixed effect or first difference Generalized Method of Moment (GMM) in estimating a model that has a DPD structure, this is, however, not appropriate for small sample size like ours (Bond, Hoeffler and Temple 2001). The OLS estimator assumes that the intercept captures the effect of all omitted, and unobservable variables are the same for all cross-sectional units. This individual effect may correlate with the included explanatory variables. Hence, omitting the individual effect would become part of the error term, which would lead to a bias in the estimates.

Blundell et al. (2000) in Baltagi, (2007) found that simulations that include the weakly exogenous covariates exhibit large finite sample bias and very low precision for the standard first-differenced estimator. In the use of the fixed effects (FE) estimator, the within transformation wipes out the μ_i , but not $(y_{i,\bar{t}-1} - \bar{y}_{i,\bar{t}-1})$.

Where $\bar{y}_{i,\bar{t}-1} = \sum_{t=2}^T y_{it} / T-1$ will still be correlated with $(v_{it} - \bar{v}_i)$ even if the v_{it} are not serially

correlated. This is because $y_{i,\bar{t}-1}$ is correlated with $\bar{v}_i$ by construction. The latter average contains $v_{i,\bar{t}-1}$ that is obviously correlated with $y_{i,\bar{t}-1}$. Fixed effect estimators will give biased and inconsistent estimates. It is only when $T \rightarrow \infty$ will the within estimators be consistent in the dynamic error component model. The random effects GLS estimator and the first-difference estimator are also biased in a dynamic panel data model (Batagi, 2007). Blundell and Bond

attribute the bias and the poor precision of the first-difference GMM estimator to the problem of weak instruments and characterize this by its concentration parameter τ .

In this study, we employed the system GMM dynamic panel estimator that could avoid these problems as our main approach to estimate our model. Our results were thereafter compared with the results obtained using Panel Least Square, fixed effect, random effect and the first difference GMM estimators. The Hausman test and the Breusch-Pagan Lagrange Multiplier (LM) test were adopted. The Hausman tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator employed while the Breusch-Pagan Lagrange Multiplier (LM) tests if the variance of the intercept components of the composite error term is zero. These are used to make choice between the use of random effects estimates and the fixed effect.

The optimal estimation technique was corrected for the presence of heteroscedasticity and cross sectional dependence. Heteroscedasticity and cross sectional dependence are major problems in panel empirical works. If heteroscedasticity is present in a model, the fixed effect, random effect and the OLS estimators produce inconsistent results. Although the consistency of the instrumental (IV) coefficient estimates is not affected but the standard errors are inconsistent, preventing valid inference. Hence, in the face of heteroskedasticity of unknown form, the use of the GMM corrects it making use of the orthogonality conditions to allow for efficient estimation. For this study, heteroscedasticity was corrected using a robust standard errors and statistics in the SYS GMM estimator.

Cross sectional dependence may arise as a result of spatial correlations, economic distance and common unobserved shocks. In the past decade, literature have been developed for analysing the effects of cross sectional dependence as well proffering ways of dealing with it in a panel model. The presence of cross sectional dependence is usually tested using the Pesaran (2004), Frees (1995) and Friedman (1937) test statistics among others. Pesaran showed that the CD test can also be applied to a wide variety of models, including heterogeneous dynamic models with multiple breaks and non-stationary dynamic models with small/large N and T . This study made use of the Pesaran (2004) and Friedman (1937) test statistics because of their compatibility to small sample size. Various methods have been proposed by past literature as a corrective measure for cross sectional dependence. Among these is the common correlated effects pooled (CCEP) estimator proposed by Pesaran (2006). The CCE has been found to suffer from small sample bias. But it has been shown by Sarafidis (2008) that the dynamic panel GMM estimator

does not require cross-sectional independent errors for consistency, however, if there is such dependence, this is weak. Although, Sarafidis and Robertson (2009) showed that the standard dynamic panel data IV and the differenced GMM estimator are inconsistent as N tends to infinity for a fixed T because the moment conditions used by these estimators are invalid under error cross-sectional dependence, hence they suggested the use of system GMM.

The technique was also evaluated on the following criteria: (i) the presence of unobserved time- and state-specific effects; (ii) the likely endogeneity of some of the regressors; (iii) the presence of overidentified model as well as (iv) autocorrelation correlation. The chosen technique was necessary to control for unobserved time- and state-specific effects because these may correlate with the right-hand side variables, and produce biased coefficients if omitted.

4.5 Justification for Model and Method of Estimation

The intuition behind the model selection was based on its capacity to capture our objectives. When panel data set are used, unobserved effects model can help to isolate the effects of group (state) specific time-invariant characteristics such as natural geographic potential, infrastructural service levels and many more. Panel data models can be used to increase the degrees of freedom, widen the range of variables, and generalize results across cross-sectional units. However, most of our economic models are implicitly or explicitly dynamic in nature (Baltagi, 2007). Hence, the study chooses to adopt a dynamic analysis in the estimation of the relationship between our variables. The dynamic panel procedure allows us to control for state-specific effects.

A commonly employed estimation procedure to estimate the parameters in a dynamic panel data model with unobserved individual specific heterogeneity is to transform the model into first differences. Sequential moment conditions are then used where lagged levels of the variables are instruments for the endogenous differences and the parameters estimated by GMM (Arellano and Bond, 1991). As documented (Blundell and Bond (1998)), the GMM estimator in the first differenced (DIF) model can have very poor finite sample properties in terms of bias and precision. This occurs when the series are persistent because the instruments are weak predictors of the endogenous changes. Blundell and Bond (1998) proposed the use of extra moment conditions that rely on certain stationarity conditions of the initial observation, as suggested by Arellano and Bover (1995). When these conditions are satisfied, the resulting

system (SYS) GMM estimator has been shown in Monte Carlo studies by Blundell and Bond (1998), and Blundell, Bond and Windmeijer (2000) to have much better finite sample properties in terms of bias and root mean squared error (RMSE) than the DIF GMM estimator. The additional moment conditions of the SYS estimator can be shown to correspond to the model in levels (LEV), with lagged differences of the endogenous variables as instruments. Blundell and Bond (1998) argued that the SYS GMM estimator performs better than the DIF GMM estimator because the instruments in the LEV model remain good predictors for the endogenous variables in the model even when the series are very persistent. They showed for an AR(1) panel data model that the reduced form parameters in the LEV model do not approach 0 when the autoregressive parameter approaches 1, whereas the reduced form parameters in the DIF model do.

Also, the system GMM estimator gives reasonable and more precise estimates of the coefficient estimated. Blundell and Bond (1998) concluded that a careful examination of the original series and consideration of the system GMM estimator can usefully overcome many of the disappointing features of the standard GMM estimator for dynamic panel models. The SYS GMM is able to control endogeneity in the model (Baltagi, 2007). Due to this ability to control for possible endogeneity of the explanatory variables (in particular, income and inequality may be endogenously determined), the finite sample bias and RMSE, the SYS GMM results are often selected relative to the DIF GMM as the most preferred. The system GMM estimator requires no knowledge concerning the initial conditions or the distributions of the error terms (v_i , and u_i). Im et al. (1999) who considered panel data models with strictly exogenous explanatory variables in a Monte Carlo simulation argued that, for example, with ten strictly exogenous time-varying variables and six time periods, the moment conditions available for the random effects (RE) model is 360 and this reduces to 300 moment conditions for the FE model. System GMM utilizing all these moment conditions leads to an efficient estimator. However, these moment conditions exceed what the simple RE and FE estimators use.

Consistency of the SYS GMM estimator, however, depends on the validity of the instruments. To address this issue, Arellano and Bover (1995) suggested two specifications. The first is the Sargen/Hansen test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample, analog to the moment conditions used in the estimation process. The second test examines the hypothesis that the error term in the differenced regression ($\dot{U}_{it} - \dot{U}_{it-1}$) is not serially correlated. One potential limitation of the SYS GMM

approach is that not much heterogeneity is allowed across the cross-sectional units. Heterogeneity is restricted to the intercept but is not permitted in the slope coefficients. Yet, if the slope coefficients vary across units lagged, values of serially correlated regressors cannot be used as valid instruments (Baltagi, 2007).

4.6 Coverage and Sources of Data

The study covered the thirty-six (36) States plus the FCT in Nigeria. The study used 19-year panel data set of four rounds, 1992, 1996, 2004 and 2010. The data for the study were obtained from various sources. Measurement of growth was captured using the real per capita expenditure for the different States. The Data generation for expenditure per capita, entails the extraction of the total expenditures for each State from the Accountant Generals's Report and Annual Budget of all the States, published in the Central Bank of Nigeria's (CBN) Annual report and statement of account. This was divided by the population of the States and all converted to real terms using the consumer price indices (in 2004 prices) from the National Bureau of Statistics (NBS). The population data was obtained from Nigeria's National Bureau of Statistics (NBS). This was based on the population census conducted by the National Population Commission for the various years as well as projections made from them. This was the closest data available to be used.

The poverty rate (head-count ratio) and the inequality measure (Gini) were also from various sources. These include the Federal Office of Statistics (poverty profile for Nigeria of 1996/1997 National Consumer Survey with reference to 1992 Survey, 1992 National Consumer Survey (NCS), the 1996 General Household Survey (GHS), the 2003/2004 National Living Standard Survey (NLSS), the harmonized Nigeria Living Standard Survey HNLSS 2009/2010 survey from the National Bureau of Statistics (NBS) (2012) and Aigbokhan (2000) research. The 1992 NCS, 1996 GHS, 2003/04 NLSS and the 2009/2010 HNLSS datasets used for the study are nationally representative datasets covering the 36 States of the Federation including the Federal Capital Territory using the consumer expenditure surveys proposed by World Bank. The differences in 1992 NCS from the new states created were accounted for. The surveys used the National Integrated Survey of Households (NISH) frame and employed multi-stage sampling with data on living standards. The GHS contained information on about 22,000 households, the NLSS contained information on about 1900 households while the HNLSS contains information on about 77,400 households. Other sources of data were NBS

Social Statistics in Nigeria for various years, NBS General Household Survey report 1995-2005, 1999-2011, NBS Annual Abstract of Statistics for various years, NBS National manpower stock and employment generation survey on household and micro enterprise (informal sector), 2010 and NBS National literacy survey in 2010.

The use of the four rounds is based on the justification of using even a two-time series and many cross-sectional panel data, as affirmed by Wooldridge (2002; 2009). The different estimation for the study was done using E-views 7.0 version of the econometric software package, Stata 11.0 and Gretl 1.9.8 application. The packages are user-friendly and make it easy for the implementation of panel data regression.

CHAPTER FIVE

PRESENTATION AND INTERPRETATION OF EMPIRICAL RESULT

5.1: Descriptive Statistics

Table 5.1 below provides the descriptive summary statistics of the variables used for the analysis.

Table 5.1: Descriptive statistics

	RY	POV	INEQ	LIT	UNMP	HHS	INWD
Mean	111.4051	56.45791	0.400651	57.43851	9.536486	4.649797	38.44047
Median	86.51909	56.45000	0.393650	64.19000	6.400000	4.460000	38.51000
Maximum	1024.964	95.07000	0.555000	94.43000	61.30000	8.900000	85.60000
Minimum	1.274899	19.98000	0.215000	5.400000	0.200000	2.810000	0.400000
Std. Dev.	117.8564	16.78373	0.052422	22.79977	9.970741	1.052252	21.29731
Skewness	4.102688	0.036621	0.514603	-0.653151	1.598197	1.104492	0.025288
Kurtosis	28.14810	2.313745	3.888238	2.256125	6.669800	5.008021	1.920720
Jarque-Bera	4315.156	5.937246	11.39744	13.93528	146.0536	54.95587	7.198985
Probability	0.000000	0.040242	0.003350	0.000942	0.000000	0.000000	0.027338
Sum	16487.95	8355.770	59.29640	8500.900	1411.400	688.1700	5689.190
Sum Sq. Dev.	2041849.	41408.98	0.403971	76414.91	14614.10	162.7635	66675.62
Observations	148	148	148	148	148	148	148

Source: Author's computation using data sourced

The variables used for the study were (RY) real per capita growth, poverty, inequality, unemployment, household size, literacy rate and unimproved sources of water as shown in Table 5.1. A high figure of real per capita growth showed high level of growth. Poverty (POV) was measured using the head count index. A high figure indicated high level of poverty being experienced in the State and country. Inequality was measured using the Gini coefficient and it lies between 0 and 1. The closer it is to 1 the higher the level of inequality in the distribution of income. We also had the literacy rate and a high figure shows high level of literacy. Unemployment (UNMP) was also used where high values showed high level of unemployment in the States and country. Furthermore, household size was used with high figures indicating high number of people in the household and finally, we had unimproved sources of water. This shows the percentage of people living on unclean sources of water. A high figure showed a

greater proportion of the population in the States and country living on unclean sources of water.

From Table 5.1, growth has a mean value of 111, a standard deviation of 117 and ranged from 1.27 to 1024.964. The result showed that the highest level of growth of 1024.964 was experienced in FCT in 1992 while Nasarawa State experienced the lowest level of growth rate in 1996. The difference between the maximum growth and minimum growth revealed the level of inequality among the States. While some States have a high share of the national income, others have only a small proportion. The mean value of poverty across the States was shown to be 56.46, a standard deviation of 19.1 and varied between 19.98 and 95.1. Jigawa State had the maximum level of poverty of 95.1 in 2004/2005 while Bayelsa recorded the lowest level of poverty in same year and this was also the lowest over the period of study. This can be as a result of the low level of inequality also experienced in Bayelsa over the period of study. Inequality had a mean of 0.4, a standard deviation of 0.05 and a minimum value of 0.22 which was experienced in FCT in 1996. The maximum value of inequality was 0.56, experienced in Jigawa State in 1996. It can be inferred that the high level of inequality experienced in Jigawa State in 1996 as compared to other States, have made the State to also experience the highest level of poverty in the following period and over the period of the study. The Literacy rate in Jigawa State was also very low over the period of study.

The Literacy rate had a mean of 57.4, a standard deviation of 22.8 and ranged from 5.4 to 94.43. The mean value of literacy rate of only 57.4 in Nigeria was relatively low as compared with other developing countries. Given that literacy rate is a major function of poverty; this can suggest the reason for the high level of poverty even in the face of high growth. The result showed that Lagos State had the highest literacy rate in 2004/2005 while Jigawa State had the lowest level of literacy rate recorded in 1992. The highest level of unemployment was recorded in 2004 and experienced by Zamfara while Adamawa State had the highest number of household size recorded in the same year. All the variables have a positive skewness with the exception of literacy rate. The diagnostics statistics also indicates that all the variables were normally distributed given their Jarque Bera values as shown in the Table 5.1

5.2 Correlation Analysis

Table 5.2 presented the Pearson correlation coefficients for the variables used in the model. The correlation matrix below provided the opportunity to assess the degree of multi-collinearity between the variables of the study before the regression analysis was carried out. Growth had a negative correlation with poverty and inequality. This suggested conformity with the theoretical expectation of a negative relationship. This was, however, contrary to our expectation since we have rising trends of growth, poverty and inequality that had been witnessed in Nigeria over the years. The correlation between growth and inequality indicated that growth benefited the poor more than the not-so-poor. This showed that the gains from growth for the poor were not lost given the fall in inequality. It further showed that the impact of growth on poverty reduction was high. The dominant correlation coefficient with growth was unemployment with a positive correlation matrix. Poverty was seen to be positively correlated with inequality, household size and unemployment and negatively correlated with literacy rate and un-improved source of water. Household size had the highest value of correlation with poverty. These were all inline with both theoretical postulation and our a priori expectations. Inequality showed a positive correlation with unemployment, literacy rate and un-improved source of water but a negative correlation with household size.

The correlation results of inequality with literacy rate and household size were, however, contrary to expectation. The negative correlation between growth and poverty on the one hand and the positive correlation between inequality and poverty on the other hand confirmed that in Nigeria, higher average growth and lower inequality were associated with lower poverty. However, examining the simple bivariate correlation in a conventional matrix does not take account of each variable's correlation with all other explanatory variables or the required explanatory variables. The result, however, showed the absence of multi-collinearity among the variables of the study. Thus, our main analysis and policy on the relationship and impact among our variables were drawn from the appropriate multivariate models estimated.

Table 5.2: Correlation Matrix: pwcrr lry pov ineq hhs unmp lit indw

	lry	pov	ineq	hhs	unmp	lit	indw
lry	1.0000						
pov	-0.2214	1.0000					
ineq	-0.1953	0.1474	1.0000				
hhs	0.0228	0.3180	-0.1941	1.0000			
unmp	0.3935	0.2264	0.0712	0.1029	1.0000		
lit	0.2302	-0.2754	0.2488	-0.3638	0.2418	1.0000	
indw	0.0853	-0.0662	0.2314	-0.0290	0.1416	0.4350	1.0000

Source: Author's computation using data source

5.3: Consistency and Efficiency Check of Result

5.3.1: Heteroscedasticity Test

The result for heteroscedasticity test was carried out using the Modified Wald test for groupwise heteroscedasticity. The result as presented in Table 5.3 showed the presence of heteroscedasticity in the three equations estimated. This was, however, corrected by running a robust standard error estimate.

Table 5.3: Heteroscedasticity Test

Model	chi2	Probability
Growth ($\ln r_{it}$)	3276.07	0.0000
Poverty (Pov_{it})	1242.57	0.0000
Inequality ($Ineq_{it}$)	3840.81	0.0000

Source: Author's computation using data sourced

5.3.2 Cross Sectional Dependence (CD) Test

The test for the presence of cross sectional dependence was carried out on the models using the method of Pesaran (2004) and Friedman (1937). The Frees (1995) method could not be used because of the small size of the time dimension of the sample. The results of the tests are presented in Table 5.4. The null hypothesis for both tests is that there is a cross sectional independence among the cross sectional units against the alternative that there is a cross sectional dependence. As shown in Table 5.4, we do not fail to accept the alternative hypothesis

for Pesaran (2004) while the null hypothesis for Friedman was accepted for the three models. The contradicting result thus led to an inclusive result. However, Frees (1995) and Pesaran (2004) noted that the problem of the CD test is that in a stationary dynamic panel data model it will fail to reject the null of error cross sectional independence.

Nevertheless, given the nature of our cross sectional units (states), there is the possibility of cross sectional dependence because the main source of revenue is federal allocation. This may have same effect on the nature of their expenditure, the growth of the States as well as the poverty level of all the States. Various researchers have come up with various ways to correct the presence of the cross sectional dependence. Among these are the common correlated effects (CCE) estimator proposed by Pesaran (2006) and the use of sieve bootstrapping. The common correlated effects (CCE) estimator is only applicable for a large sample size while the sieve bootstrapping method is only applicable when $T > N$: If, $N > T$, the problem Nickell bias arises and the bootstrapping method fails. For this study, both methods could not be used as a result of the small sample size and $N > T$. Furthermore, the standard differenced GMM estimator may also suffer from poor finite sample properties in terms of bias and precision (Sarafidis, 2008).

However, Sarafidis (2008) and Sarafidis, Yamagata, and Robertson (2008) noted that in the face of cross sectional dependence (homogenous and heterogeneous), the system GMM estimator, can be a reliable alternative to the standard GMM estimators to give consistent estimate. If cross sectional dependence is present at all, it is weak and cannot invalidate the result. Also, the overidentifying restrictions test is regarded as a misspecification test, because it is usually designed to detect violations of moment conditions, which are the heart of GMM methods. Thus, it has the power under the alternative hypothesis of heterogeneous error cross section dependence. Hence for this study, the presence of cross sectional dependence was corrected by employing the system generalized method of moment.

Table 5.4: Abridged Presentations of Cross Sectional Dependence (CD) Test

Model	Pesaran		Friedman	
	Statistics	probability	statistics	probability
Poverty (pov)	5.485	0.000	4.919	1.0000
Growth (RY)	15.728	0.0000	13.622	0.9997
Inequality (INEQ)	4.011	0.0001	10.432	1.0000

Source: Author's computation using data sourced

5.4: Empirical Result of Dynamic Relationships among Growth, Poverty, and Inequality

Table 5.5: Estimation using Growth ($\ln y_{it}$) as Dependent Variable

	SystemGMM	First Differenced	Fixed Effect	Panel Least Squares
Explanatory variables	Coefficient/Standard Error	Coefficient/Standard Error	Coefficient/Standard Error	Coefficient/Standard Error
$\ln y_{it-1}$	1.327491 (0.604394)*	0.1839 (0.2279)	0.8757 (0.0109)*	0.8871 (0.0099)*
Ineq_{it-1}	26.71389 (9.874219)*	4.6570 (2.6602)	0.1097 (0.2570)	0.2784 (0.2194)
Pov_{it-1}	0.0400993 (0.028517)	0.0228 (0.0098)*	0.0023 (0.0009)*	0.0010 (0.0007)
HHS	0.4809865 (0.459954)	0.1601 (0.2145)	-0.0163 (0.0163)	-0.006 (0.0109)*
UNMP	0.0844864 (0.025457)*	0.0715 (0.0117)*	0.0052 (0.0002)*	0.0034 (0.0012)
INDW				
LIT				
Intercept	-17.29299 (8.344463)		0.4183 (0.0000)	0.3442 (0.0937)
Fixed effect (cross)				
Abia			-0.001080	
Adamawa			-0.009595	
Akwa Ibom			0.048659	
Anambra			0.029337	
Bayelsa			0.158103	
Bauchi			-0.165669	
Benue			-0.004488	
Borno			-0.013005	
Cross Rivers			-0.026414	
Delta			0.064990	
Edo			0.005350	
Enugu			-0.032299	
Imo			-0.027020	
Jigawa			-0.037754	
Kaduna			0.003751	
Kano			-0.044070	

Kastina			-0.072636	
Kebbi			-0.047684	
Kogi			-0.086216	
Kwara			-0.001970	
Lagos			-0.011768	
Niger			0.000271	
Ogun			-0.000126	
Ondo			-0.029756	
Oyo			-0.039772	
Platueau			0.027140	
Rivers			0.078960	
Sokoto			-0.086522	
Taraba			-0.011732	
Yobe			-0.042295	
FCT			0.135832	
Ebonyi			0.002654	
Gombe			-0.047053	
Nassarawa			0.350668	
Osun			-0.017322	
Zamfara			-0.082217	
Ekiti			0.032749	
F test (5, 36)	stat= 7.13 ; Pr>stat=0.0000		R ² =0.995414 Adj R ² =0.99269	R ² =0.991048 Adj
Hansen test	Chi ² (9)= 11.00; Pr>chi2=0.276	14.71953 0.000636	F(sat)= 365.2672 F(pro)=0.000000 DW= 2.856904	R ² =0.990622 F(sat)= 2324.840 F(pro)= 0.00000 DW =1.412465
Instrument rank AR(1)		7	Hausman test (Chi ² (5)) = 26.750386 pro = 0.0399	
AR(2)	Z=-2.73; Pr>z=0.006 Z=1.59; Pr>Z=0.111			

Note: The number of observations used was 111, and the number of groups in the panel was 37, period 1992-2010 using four years panel;

For First difference, the number of observations used was 74, and the number of groups in the panel was 37, the period 1992-2010 using four years panel, sample adjusted (2004-2010)

*Indicates significant at 5% level of significance

Null hypothesis of Sargan /Hansen test: All instruments are valid

Null hypothesis of Hausman test= reject fixed effect result

Source: Author's computation using data sourced

Table 5.6: Estimation using Inequality(Ineq_{it})as Dependent Variable

	System GMM	First Differenced	Fixed Effect	Panel Least Squares
Explanatory variables	Coefficient/Standard Error	Coefficient/Standard Error	Coefficient/Standard Error	Coefficient/Standard Error
lnry _{it-1}	0.0131108 (0.005988)*	-0.0229 (0.0046)*	-0.0205 (0.0057)*	0.0169 (0.0050)*
Ineq _{it-1}	-0.3228915 (0.1564739)*	-0.0415 (0.1695)	-0.5432 0.1293)*	-0.0181 (0.1146)
Pov _{it-1}	-0.000261 (0.000332)	-0.0011 (0.0004)*	0.0004 (0.0005)	-0.0003 (0.0003)
HHS				
UNMP	-0.0006155 (0.00056)	0.0013 (0.0004)*	0.0009 (0.0007)	-0.0002 (0.0005)
INDW			0.0004 (0.0005)	
LIT	0.0006128 (0.000335)	0.0010 (0.00050)*		0.0004 (0.0003)
Intercept	0.4695171 (0.085399)		0.6528 (0.0523)	0.3373 (0.0651)
Fixed effect (cross)				
Abia			-0.015572	
Adamawa			0.068283	
Akwa Ibom			-0.002323	
Anambra			0.019878	
Bayelsa			0.006863	
Bauchi			-0.051687	
Benue			0.027933	
Borno			-0.042581	
Cross Rivers			0.005375	
Delta			0.013144	
Edo			-0.019349	
Enugu			0.054672	
Imo			0.000978	
Jigawa			-0.145947	.
Kaduna			0.001623	
Kano			-0.017280	

Kastina			-0.011486	
Kebbi			-0.111676	
Kogi			0.034904	
Kwara			0.047568	
Lagos			0.024042	
Niger			-0.010209	
Ogun			0.053926	
Ondo			-0.029019	
Oyo			-0.008420	
Platueau			0.042199	
Rivers			0.093781	
Sokoto			-0.046804	
Taraba			0.044454	
Yobe			0.006741	
FCT			0.144084	
Ebonyi			0.008851	
Gombe			-0.003109	
Nassarawa			-0.045659	
Osun			-0.065664	
Zamfara			-0.075429	
Ekiti			0.002916	
F test (5, 36)	stat=11.54; Pr>stat=0.0000	1.837631 0.398991 7	R ² =0.667230 Adj R ² =0.469498 F(sat)= 3.374405 F(pro)=0.000004 DW= 2.525599 Hausman test (Chi ² (5)) = 89.617888 pro = 0.00000	R ² =0.172012 Adj R ² =0.13258 F(sat)=4.362690 F(pro)=0.001199 DW=1.900247
Hansen test	Chi ² (8)= 14.14; Pr>chi2=0.059			
Instrument rank	Z=-1.50; Pr>z=0.134			
AR(1)	Z=-1.48; Pr>Z=0.138			
AR(2)				

Note: The number of observations used was 111, and the number of groups in the panel was 37, period 1992-2010 using four years panel;

For First difference, the number of observations used was 74, and the number of groups in the panel was 37, the period 1992-2010 using four years panel, sample adjusted (2004-2010)

*Indicates significant at 5% level of significance

Null hypothesis of Sargan /Hansen test: All instruments are valid

Null hypothesis of Hausman test= reject fixed effect result

Source: Author's computation using data sourced

Table 5.7: Estimation using Poverty (Pov_{it}) as Dependent Variable

	System GMM	First Differenced	Fixed Effect	Panel Least Squares
Explanatory variables	Coefficient/Standard Error	Coefficient/Standard Error	Coefficient/Standard Error	Coefficient/Standard Error
$\ln y_{it-1}$	4.51442 (2.03389)*	-2.8468 (0.6582)*	-3.276274 (1.003013)*	-2.9976 (0.7247)*
$\ln eq_{it-1}$	-108.5505 (25.14108)*	-101.921 (20.1029)*	-81.38190 (24.64419)*	-120.105 (23.033)*
Pov_{it-1}	0.3010757 (0.116976)*	-0.3559 (0.1898)	-0.318712 (0.098214)*	0.3018 (0.0935)*
HHS	0.8357215 (1.647727)	3.9587 (1.3167)	3.768599 (1.524171)*	1.2595 (1.3278)
UNMP	0.5493652 (0.206943)*	0.3647 (0.0586)*	0.298037 (0.121124)*	0.3012 (0.1119)*
INDW	-0.028037 (0.128514)	-0.0486 (0.0657)	0.020527 (0.076035)	
LIT	-0.6360978 (0.132989)*	0.0899 (0.0848)	0.079321 (0.095711)	-0.2352 (0.0647)*
Intercept	97.60476 (19.67979)		96.71826 (10.57102)	0.3442 (0.0937)
Fixed effect (cross)				
Abia			-16.10986	
Adamawa			10.72324	
Akwa Ibom			-7.113754	
Anambra			-25.59524	
Bayelsa			-27.45876	
Bauchi			21.60427	
Benue			0.538842	
Borno			-11.45510	
Cross Rivers			-10.33985	
Delta			-3.244055	
Edo			-13.41723	
Enugu			-13.75600	
Imo			-19.39953	
Jigawa			18.41030	
Kaduna			-10.32466	
Kano			-5.647228	
Kastina			10.33024	

Kebbi			20.85199	
Kogi			34.67411	
Kwara			26.73162	
Lagos			-0.740777	
Niger			-11.20938	
Ogun			1.877078	
Ondo			-5.298417	
Oyo			-22.08216	
Platueau			8.143537	
Rivers			-17.14533	
Sokoto			21.81936	
Taraba			2.312819	
Yobe			27.13789	
FCT			-0.203500	
Ebonyi			-7.264127	
Gombe			19.62254	
Nassarawa			6.426900	
Osun			-5.862144	
Zamfara			9.139637	
Ekiti			-6.677270	
F test (5, 36) Hansen test Instrument rank AR(1) AR(2)	stat 177.917 Pr >stat=0.0000 chi2(17)=24.93 Prob > chi2 = 0.096 Z=-2.65; Pr>z=0.008 Z=-1.63 Pr>Z=0.104	1.062356 0.587912 9	R ² =0.820600 Adj R ² =0.705463 F(sat)= 7.127141 F(pro)=0.000000 DW= 2.862280 Hausman test (Chi ² (5)) = 99.226118 pro = 0.00000	R ² =0.498059 Adj R ² =0.463947 F(sat)=14.60051 F(pro)=0.000000 DW=2.028019

Note: The number of observations used was 111, and the number of groups in the panel was 37, period 1992-2010 using four years panel;

For First difference, the number of observations used was 74, and the number of groups in the panel was 37, the period 1992-2010 using four years panel, sample adjusted (2004-2010)

*Indicates significant at 5% level of significance

Null hypothesis of Sargan /Hansen test: All instruments are valid

Hausman test - Null hypothesis: GLS (Random effect) estimates are consistent

Source: Author's computation using data sourced.

The estimation results of equations 4.11, 4.12 and 4.13 are shown in Table 5.5, 5.6 and 5.7. Each equation was estimated using the 1 step system GMM method proposed by Blundell and Bond (1998) with a robust standard error, first difference GMM, Fixed effect and panel least squares. Failure to reject the null hypothesis related to the Hansen test confirmed the Hansen Statistics of over identification restrictions (suggesting no invalid over-identifying restrictions). The null hypothesis of the Hansen test is that all instruments are valid. Also, the Arellano-Bond test of autocorrelation (validating the use of the suitable lagged endogenous variable as an instrument) gave the support to a correct model specification for the system GMM and the first differenced GMM. The models also passed the Ftest, a test for joint significance. The Hausman test confirmed the use of fixed effect over Random effect. In all specifications, the Hansen test, AR(1), AR(2), Hausman test and the F test are reported at the bottom of the column. Table 5.6, 5.7 5.8 showed the estimation results with different controls for each equation. The results were presented based on equation by equation for the system GMM estimation because of the number of periods in our study. These equations would have been estimated simultaneously using panel VAR approach that provides a gain in efficiency.

Equation 4.11 which was growth showed that for the system GMM estimation, the estimate of δ_{11} that measured previous growth is 1.32, and significantly different from zero at 5% level. The result thus economically indicated that the growth rate was higher for States that had higher previous growth. In our model, the effect of inequality on growth across States was captured by parameter δ_{12} and this was 26.71 which are significantly different from zero at 5% level. It showed that 1% increase in previous level of inequality led to 26.7 % increase in growth. This supported the classical theories on the relationship between growth and inequality. This is in line with some research findings (Pervaiz and Chaudhary, 2010 and Forbes, 2000) but contrary to the findings of others (Alesni and Rodrik, 1994). According to Barro (2000), there is a negative effect of inequality on growth for poor countries and, a positive effect on rich countries. However, as noted by Edin and Topel (1997), inequality is linked to growth-promoting factors such as entrepreneurship, innovation, and risk-taking.

Also, savings that provides for investment and high capital accumulation also affects the level of inequality and this leads to economic growth as advocated by Harrod-Domar's models and Lewis's model. Poverty, household size, and unemployment also showed a positive relationship with growth although only unemployment proved to be significant. The result showed that 1%

increase in previous poverty leads to 0.04% increase in growth. This is, however, marginal but it economically showed that Nigeria's growth rate is not affected by the rate of poverty. This is, contrary to the findings of Pervaiz and Chaudhary (2010) who found a negative impact of poverty on growth in the study carried out for Pakistan. Hence, the country is experiencing increase in growth in the face of the rising poverty level in the States and the nation at large. Growth rate is also increasing even in the face of the increase in inequality and unemployment rate.

In comparison with the other methods of estimation, we found that the signs and significance of the panel least squares and first difference GMM for the estimate of equation 4.11 ($\ln y_t$) are similar to the system GMM results and the J statistics for Sargan test was found to be in order. Although, inequality was found not to be significant in Panel Least Squares and the first difference GMM estimation, previous growth was not significant in the result of the first difference GMM. In addition, the results of the R^2 and the adjusted R^2 were very high in the Panel Least Square estimation confirming the problem of endogeneity and multicollinearity as a result of the lagged dependent variable. Hence the result was biased. The result based on the fixed effect specification of equation 4.11 differs reasonably from the system GMM result. The coefficient estimates based on fixed effect are statistically insignificant, and the lag of growth showed a negative relationship with growth.

In the result of the estimate of equation 4.12, β_{22} was used to measure the impact of previous levels of inequality on present level of inequality. It was estimated to be -0.3228 which is closer to zero (in absolute term) and significantly different from zero at 5% level. This implied that 1% increase in the previous level of inequality led to 0.3228% fall in the present level of inequality. Economically, this implied that previous levels of inequality brought about a fall in the present level of inequality. This is, however, contrary to our expectation given the rising trend in the level of inequality in Nigeria. It is also contrary to the findings based on country data of B'enabou (1996) and country panel study of Thailand carried out by Kurita and Kurosaki (2007). But, it is however, consistent with the study of Niehues (2010).

The parameter β_{21} measured the impact of initial growth on the present level of inequality across the States. It gave a coefficient of 0.131 which is significantly different from zero at 5% level. The result showed that initial growth increases the present level of inequality in the States. 1% increase in the previous year's growth of the States and the nation at large led to

0.131% increase in present inequality. Thus, States in which the initial growth level was high tend to become more unequal in the subsequent period than States with a low initial growth level. The relationship between poverty and inequality came out with a result contrary to our expectation. The result shows that 1% increase in previous poverty leads to 0.0002% fall in present inequality which is not significant. The magnitude is, however, close to zero and cannot be said to really have impact. Thus, we concluded that previous year's level of poverty does not affect present level of inequality. The relationship between inequality and unemployment on the one hand and between inequality and literacy rate, on the other hand, are also contrary to our expectation. Their magnitudes are also very small and they are also not significant. Theoretically, increase in literacy rate is expected to reduce the level of inequality. However, according to Inter-Regional Inequality Facility(2006), there is a positive relationship between high levels of income inequality and low school enrolment (low literacy rate), low life expectancy, and high fertility (as is the case of Nigeria) among other variables. These show the multidimensional impact of income inequality.

Also, comparing the result of the system GMM with the other estimates, we found that the signs and significance of the Panel Least Square were similar to the system GMM results. But, the results of the R^2 and the adjusted R^2 of the Panel Least Square were very low for the result to be accepted. The result of the first difference GMM was totally different from the system GMM result although the J statistics for Sargan test was found to be in order. The lag of growth came out with negative sign while the lag of poverty, literacy rate and unemployment were found to be significant contrary to the result of system GMM. However, Blundell and Bond have proved that the results from the first difference are biased and suffer from poor precision that is attributed to the problem of weak instruments and characterizes this by its concentration parameter τ . The fixed effect result of the equation 4.12 performed very poorly as compared to the system GMM. Poverty came out with a positive sign and inequality was found significant.

The results of the estimate of equation 4.13 showed that previous levels of growth and poverty affected the present level of poverty positively and were statistically significant. This suggested that poverty across the States is a positive function of growth. This contradicted the theoretical provision of an inverse relationship between poverty and income that increase in growth will lead to a reduction in poverty. The result indicated that 1% increase in growth led to 4.5% increase in poverty across States. Economically, this implied that the increase in

growth had been in the hand of the few which was unlikely to be circulated. The consequence on the States and the economy at large was to worsen poverty by 4.5% as the result suggests. This further supports the findings that growth in Nigeria is not pro-poor and is consistent with the finding of other studies (UNDP (1998), NPPA (2000), Bello and Roslan (2010) and Ichoku et. al (2012)). The previous level of inequality affected the subsequent level of poverty across States with negative sign and a very high magnitude. It was also statistically significant from zero at 5% level. Thus, poverty is highly affected by inequality in Nigeria. As we expected, the effect of lagged growth (b31) and poverty (b33) were positive while the effect of lagged inequality (b32) was negative contrary to our expectation. The coefficient of lagged poverty (b33) which was not analyzed in the previous literature was positive as shown in Table 5.5. This indicated that States with higher level of poverty in the previous period ($Poverty_{t-1}$) tended to experience lower poverty reduction. Poverty in the previous year tends to increase poverty in the present year. The result of the previous level of inequality showed that a lower initial inequality increased the speed at which poverty headcount index is reduced in Nigeria. This is, contrary to the study carried out by Kurita and Kurosaki (2007) for Thailand.

Unemployment and house-hold size were related to poverty as expected in economic theory, our a priori expectation and previous studies (Iyoko, 2012, Budiantara, Diana and Darmesto, 2011; Osinubi, 2005; Islam, 2004). Unemployment had a positive and significant relationship with poverty. The effect of unemployment was higher in the face of high male unemployment as in the case of Nigeria. The result showed that 1% increase in the unemployment rate for the State and applied to the country leads to 54% increase in poverty. Thornton et. al. and Blank in Formby et. al. (2001) showed that increases in the male unemployment rate and high female-headed households are undoubtedly associated with increases in poverty. Household size had a positive but insignificant relationship with poverty. According to World Bank (2010) household survey, it is clear that regions with very high household sizes are also the ones with very high incidences of poverty, confirming that household size matters for poverty in Nigeria. The study of Ichoku et. al. (2012) also supported this finding.

Un-improved source of water had a negative and insignificant relationship with poverty. Literacy rate showed a negative and significant relationship in line with economic theory and the study carried out by Psacharopoulos, Morley, Fiszbein, Lee and Wood (1995) that the spread of education reduces the incidence of poverty. The result showed that 1% increase in the

literacy rate leads to 63% fall in the level of poverty. This economically points out the role of education and human capital development. Enhancing our educational system is paramount for effective poverty reduction.

The estimate of equation 4.13 using panel least squares, fixed effect and the first difference showed that all the results are different. The result of the least squares showed a negative relationship between lagged poverty and poverty and a negative relationship between the lag of growth to poverty that is contrary to the result of the system GMM although the significance of the variables were the same. The result of the fixed effect estimate is totally contrary to that of the system GMM in terms of the signs and the significance. Lag of growth was insignificant in the fixed effect contrary to the system GMM. Same applies to the result of the first difference GMM. The lag of Poverty, inequality, and growth all came with negative signs with poverty contrary economic theory and expectation. The lag of growth was not significant in the first difference GMM. There were also differences in the size of the coefficients.

In general, the system GMM results show larger coefficient (in absolute values) than the fixed effect results. The difference was particularly significant for coefficients β_{11} and β_{22} . The fixed effect estimates for parameter β_{11} was negative statistically less significant and β_{22} was negative and significant while that of system GMM showed that β_{11} was positive and significant while β_{22} was positive and insignificant. Since the Panel Least Square, first difference GMM and fixed effect were biased due to the DPD structure, we adopted the system GMM estimate.

5.5 Evaluation of Hypotheses

In consideration of the results obtained from the analysis, we evaluate the hypotheses of the study. The study was guided by the following hypotheses

- I. Poverty has no significant relationship with growth in Nigeria.
- II. There is no significant relationship between poverty and inequality in Nigeria.
- III. There is no significant relationship between growth and inequality in Nigeria.

Test of hypothesis I

From the results of the system equations (4.11 and 4.13), poverty does not significantly affect growth at 5% level of significance (equation 4.11), but growth was found to be positive and significantly affect poverty (equation 4.13). Thus, we reject the null hypothesis, and conclude that poverty has a significant relationship with growth with growth affecting poverty in Nigeria.

Test of hypothesis II

From the results of the estimates of equations 4.12 and 4.13, poverty was found not to have any significant relationship with inequality at 5% level of significance but inequality was found to significantly affect poverty. We, therefore, do not fail to reject the null hypothesis and conclude that there is a significant relationship between poverty and inequality with inequality affecting poverty in Nigeria.

Test of hypothesis III

As shown in the estimates of equations 4.11 and 4.12, inequality has a significant relationship with growth at 5% level of significance and growth has a significant relationship with inequality. We, therefore, do not fail to reject the null hypothesis and conclude that there is a significant relationship between inequality and growth in Nigeria.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary of the Findings

Poverty and inequality is still rampant in developing countries and are increasing over the years even in the face of increasing growth. The reduction of poverty is topmost in macroeconomic policies of the world particularly the developing countries. Although various solutions have been recommended by researchers, yet there are disagreements as to the right policy measure to be applied. Some of the reasons for this could be as a result of the complicated nature of poverty, failure to channel solutions to country specific problems etc.

This study analyzed the dynamics of poverty-growth-inequality nexus in Nigeria, to understand the reason behind the rising poverty in the face growth and to develop policy measures to combat the rising poverty in the country. The specific objectives are to: analyze the relationship between poverty and growth in Nigeria; ascertain the relationship between poverty and inequality in Nigeria; evaluate the statistical relationship between growth and inequality in Nigeria and thus draw out targeting policy measures.

Poverty was measured using the head count ratio, inequality was captured using the Gini coefficient and growth was measured using real per capita expenditure. Other related and important variables were also included in a panel study. The result of the study showed that growth and inequality had significant relationship with poverty. Growth had a positive relationship and inequality a negative relationship. In addition, growth and inequality were found to have positive and significant effects on each other. Thus, the country was growing in the face of the rising inequality. Previous poverty level had a positive and significant impact on the present and subsequent poverty level, previous inequality had a negative and insignificant impact on present inequality and previous growth had a positive and insignificant impact on present and subsequent growth. Hence, there was increasing growth and poverty over the years. The study found that in addition to inequality, other major determinants of poverty were unemployment rate and the literacy rate.

6.2 Conclusion

Poverty in the face of abundance is a major macroeconomic problem. The effective policy measures to tackle this are of crucial importance to the efficient utilization of the country's resources as well as the development of Nigeria. However, analyzing poverty alone is of less relevance given that poverty has been found to be related to the growth on one hand, and inequality on the other hand. Growth has also been found to be related to inequality. Hence, in this study, it became imperative for us to look at not the effect of the just the present levels of these variables but to determine the effect of the previous levels of these variables in the analysis of the triangle given the possibility of the vicious circle of poverty.

The findings of this study have increased our understanding of the nature of the relationship among these three major macroeconomic variables. The high previous level of poverty and growth increase the present level of poverty and addressing the middle variable, inequality, is of vital importance. Incorporating the findings of this study is of immense importance for the formulation of effective policy measures in the poverty alleviation programmes. Specifically, it is believed that implementing the recommendations of this study will enhance the efficient utilization of resources by channeling it to the right actions. This will facilitate the reduction of the high poverty rate in the country that seems indomitable and enhance the development of the country in the face of growth.

6.3 Policy Recommendations

The following recommendations are made from the result of this study:

Polarization in distribution has contributed to increased poverty with its effect on increasing growth and widening the gap between the rich and the poor. Understanding the country-specific inequality link with poverty and growth is needed for effective poverty reduction policies. Thus, there is need for policy measures towards equitable distribution of income. As shown from the result of the study, poverty rate in Nigeria depends on both growth and inequality. Thus, lowering the high rate of inequality is important for the reduction of poverty. There is need to ensure equity in the distribution of the income in the country particular in those States with very high poverty rate. Reduction of inequality will make growth pro-poor.

The previous levels of poverty need to be put into consideration in policy formulation. Hence, policy formulation targeted at reducing poverty at a particular long term, should develop a

short term frame work of reducing the rate of poverty in the few years before the targeted long term.

Individuals, communities, stakeholders and policy makers should assist government to identify the poor in Nigeria. Once properly identified, the poor should be targeted via guided pro-poor programs and not ad hoc measures. Also, Biometrics of the poor should be taken to allow proper poor tracking.

There is also the need to involve those most affected by poverty with strategies such as consulting them on what they really need. It is also recommended that cash transfer programs to low-income families and improved taxation policies should be applied for effective reduction of poverty.

Furthermore, the development of long-term strategic plans that address unemployment is paramount. Employment is an important outcome of any welfare intervention. This can be achieved through the creation of more jobs by the government and empowering the private sectors to be able to create more jobs. Capital should be provided for those that have entrepreneurial skills and are being hindered by lack of capital. Human capital development is also inevitable.

In addition, education is indispensable to poverty reduction. It is well acknowledged that there is a strong relationship between education and poverty. As shown in this study, literacy rate has a significant poverty reduction impact. A balanced educational system enhances the productivity of the individuals, and generates individual per capita income. This will take the individual away from poverty. Thus, it is recommended that policy measures towards improving the quality of education through revitalizing the educational curriculum as well as increasing the accessibility of education particularly in the rural areas should be adopted.

Policy measures should be aimed also at reducing the household size through population control measures. This includes the use of fewer children and family planning particularly in the rural areas and the northern part of the country where there is high prevalence of poverty as compared to other areas.

Finally, institutionalization of good governance that upholds accountability, reduction in corruption and transparency in the use of scarce national resources is highly recommended.

6.4 Contribution to Knowledge

Although some studies have been carried out on Poverty-Growth-Inequality nexus, this present study has contributed to knowledge in various ways. First, the study has been able to establish a firm understanding of the interactions among poverty, growth and inequality in Nigeria. It has been established that inequality is the linking variable and policy formulation towards transmitting growth into poverty reduction should concentrate on the use of the growth to reduce inequality. The dynamic changes in these variables have been clearly exposed. The gap in literature on the flow of the triangle and the possibility of the previous levels of poverty, growth and inequality influencing the relationship of the triangle has been established. Secondly, the study was able to establish the best approach in analyzing this interaction among the variables by using the system generalized method of moment rather than the use of Panel Least Square, fixed/random effect and the first differenced generalized method of moment that has been used by past studies. The study has also been able to show that the use of real per capita expenditure measure of growth shows a better measure of welfare rather than the nominal measure.

6.5 Suggestions for Further Research

This study has been able to establish that the high rate of inequality has hindered the impact of growth on poverty reduction in Nigeria. The study employed only one measure of poverty, the headcount poverty index and the gini measure of inequality. Analyzing the possibility of a dynamic relationship among these variables using different measures of poverty and inequality may come up with different findings and deeper understanding. This may help in providing better policy for the reduction of poverty rate in Nigeria. Hence this study recommends that for further study, the different measures of poverty and inequality should be used.

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APPENDICES

Appendix 1

System-GMM Estimation Results for Growth

Dynamic panel-data estimation, one-step system GMM

```
-----
Group variable: stateid                Number of obs      =       111
Time variable : timevar                Number of groups   =        37
Number of instruments = 15              Obs per group: min =         3
F(5, 36)          =       7.13          avg =       3.00
Prob > F          =       0.000          max =         3
-----
```

	Coef.	Std. Err.	Robust t	P> t	[95% Conf. Interval]	
lry						
L1.	1.327491	.604394	2.20	0.035	.1017228	2.553258
ineq						
L1.	26.71389	9.874219	2.71	0.010	6.68805	46.73974
pov						
L1.	.0400993	.0285166	1.41	0.168	-.0177351	.0979336
hhs	.4809865	.4599536	1.05	0.303	-.4518427	1.413816
unmp	.0844864	.0254571	3.32	0.002	.0328569	.1361158
_cons	-17.29299	8.344463	-2.07	0.045	-34.21634	-.369636

Instruments for first differences equation

Standard

D.(pov ineq)

GMM-type (missing=0, separate instruments for each period unless collapsed)

.(pov ineq lry)

Instruments for levels equation

Standard

pov ineq

 _cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

DL.(pov ineq lry)

Arellano-Bond test for AR(1) in first differences: z = -2.73 Pr > z = 0.006

Arellano-Bond test for AR(2) in first differences: z -1.59 Pr > z = 0.111

Sargan test of overid. restrictions: chi2(9) = 12.39 Prob > chi2 = 0.192
(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(9) = 11.00 Prob > chi2 = 0.276
(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(3) = 6.92 Prob > chi2 = 0.075

Difference (null H = exogenous): chi2(6) = 4.08 Prob > chi2 = 0.666

iv(pov ineq)

Hansen test excluding group: chi2(7) = 8.76 Prob > chi2 = 0.271

Difference (null H = exogenous): chi2(2) = 2.24 Prob > chi2 = 0.326

Source: Author's computation using sourced data

Appendix2

System-GMM Estimation Results for Inequality

Dynamic panel-data estimation, one-step system GMM

Group variable: stateid	Number of obs	=	111
Time variable : timevar	Number of groups	=	37
Number of instruments = 25	Obs per group: min	=	3
F(5, 36) = 11.54	avg	=	3.00
Prob > F = 0.000	max	=	3

ineq	 Coef.	Std. Err.	Robust t	P> t	[95% Conf. Interval]
lry	L1.	.0131108	.005988	2.19	0.035 .0009665 .025255
ineq	L1.	-.3228915	.1564739	-2.06	0.046 -.6402353 -.0055476
pov	L1.	-.000261	.0003317	-0.79	0.437 -.0009338 .0004118
unmp		-.0006155	.00056	-1.10	0.279 -.0017512 .0005202
lit		.0006128	.0003349	1.83	0.076 -.0000665 .001292
_cons		.4695171	.0853994	5.50	0.000 .2963191 .642715

Instruments for first differences equation

Standard

D.(pov lit unmp hhs)

GMM-type (missing=0, separate instruments for each period unless collapsed)

L.(pov ineq lry lit)

Instruments for levels equation

Standard

pov lit unmp hhs

_cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

D.(pov ineq lry lit)

Arellano-Bond test for AR(1) in first differences: z = -1.50 Pr > z = 0.134

Arellano-Bond test for AR(2) in first differences: z = 1.48 Pr > z = 0.138

Sargan test of overid. restrictions: chi2(19) = 106.93 Prob > chi2 = 0.000
(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(19) = 29.45 Prob > chi2 = 0.059
(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(7) = 13.15 Prob > chi2 = 0.069

Difference (null H = exogenous): chi2(12) = 16.30 Prob > chi2 = 0.178

iv(pov lit unmp hhs)

Hansen test excluding group: chi2(15) = 27.94 Prob > chi2 = 0.022

Difference (null H = exogenous): chi2(4) = 1.51 Prob > chi2 = 0.825

Source: Author's computation using sourced data

Appendix3

System-GMM Estimation Results for Poverty

Dynamic panel-data estimation, one-step system GMM

Group variable: stateid	Number of obs	=	111
Time variable : timevar	Number of groups	=	37
Number of instruments = 25	Obs per group: min	=	3
F(7, 36) = 17.28	avg	=	3.00
Prob > F = 0.000	max	=	3

		Coef.	Std. Err.	Robust t	P> t	[95% Conf. Interval]	
pov							
lry	L1.	4.514421	2.033889	2.22	0.033	.3895019	8.639339
ineq	L1.	-108.5505	25.14108	-4.32	0.000	-159.539	-57.56201
pov	L1.	.3010757	.1169764	2.57	0.014	.0638366	.5383148
hhs		.8357215	1.647727	0.51	0.615	-2.506025	4.177468
unmp		.5493652	.2069433	2.65	0.012	.1296648	.9690657
inwd		-.028037	.1285136	-0.22	0.829	-.2886746	.2326006
lit		-.6360978	.1329896	-4.78	0.000	-.9058133	-.3663823
_cons		97.60476	19.67979	4.96	0.000	57.69229	137.5172

Instruments for first differences equation

Standard

D.(pov ineq lry hhs)

GMM-type (missing=0, separate instruments for each period unless collapsed)

L2.(pov ineq lry hhs unmp)

Instruments for levels equation

Standard

pov ineq lry hhs

_cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

DL.(pov ineq lry hhs unmp)

Arellano-Bond test for AR(1) in first differences: z = -2.65 Pr > z = 0.008

Arellano-Bond test for AR(2) in first differences: z = -1.63 Pr > z = 0.104

(included by me)

Sargan test of overid. restrictions: chi2(17) = 57.87 Prob > chi2 = 0.000

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(17) = 24.93 Prob > chi2 = 0.096

(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(7) = 16.85 Prob > chi2 = 0.018

Difference (null H = exogenous): chi2(10) = 8.08 Prob > chi2 = 0.621

iv(pov ineq lry hhs)

Hansen test excluding group: chi2(13) = 17.94 Prob > chi2 = 0.160

Difference (null H = exogenous): chi2(4) = 7.00 Prob > chi2 = 0.136

Source: Author's computation using sourced data

Appendix 4

Panel least Square Estimation of Growth

Dependent Variable: LOG(RY)
 Method: Panel Least Squares
 Date: 03/16/14 Time: 14:24
 Sample (adjusted): 1996 2010
 Periods included: 3
 Cross section included: 37
 Total panel (balanced) observations: 111

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.344186	0.093741	3.671663	0.0004
LOG(RY-1)	0.887113	0.009983	88.86473	0.0000
INEQ(-1)	0.278380	0.219405	1.268800	0.2073
POV(-1)	0.001000	0.000690	1.449160	0.1503
HHS	-0.005765	0.010903	-0.528789	0.5981
UNMP	0.003384	0.001227	2.757669	0.0069
R-squared	0.991048	Mean dependent var	4.220524	
Adjusted R-squared	0.990622	S.D. dependent var	1.179506	
S.E. of regression	0.114225	Akaike info criterion	-1.448750	
Sum squared resid	1.369979	Schwarz criterion	-1.302289	
Log likelihood	86.40561	Hannan-Quinn criter.	-1.389335	
F-statistic	2324.840	Durbin-Watson stat	1.412465	
Prob(F-statistic)	0.000000			

Source: Author's computation using sourced data

Appendix 5

Panel least Square Estimation of Inequality

Dependent Variable: INEQ
 Method: Panel Least Squares
 Date: 03/16/14 Time: 14:27
 Sample (adjusted): 1996 2010
 Periods included: 3
 Cross section included: 37
 Total panel (balanced) observations: 111
 White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.337341	0.065124	5.180008	0.0000
LOG(RY(-1))	0.016852	0.005035	3.346803	0.0011
INEQ(-1)	-0.018068	0.114619	-0.157639	0.8750
POV(-1)	-0.000256	0.000269	-0.949851	0.3444
LIT	0.000426	0.000266	1.605169	0.1115
UNMP	-0.000178	0.000467	-0.380990	0.7040
R-squared	0.172012	Mean dependent var	0.407625	
Adjusted R-squared	0.132584	S.D. dependent var	0.058046	

S.E. of regression	0.054061	Akaike info criterion	-2.944855
Sum squared resid	0.306877	Schwarz criterion	-2.798393
Log likelihood	169.4394	Hannan-Quinn criter.	-2.885440
F-statistic	4.362690	Durbin-Watson stat	1.900247
Prob(F-statistic)	0.001199		

Appendix 6

Panel least Square Estimation of Poverty

Dependent Variable: POV

Method: Panel Least Squares

Date: 03/16/14 Time: 14:02

Sample (adjusted): 1996 2010

Periods included: 3; s included: 37

Total panel (balanced) observations: 111

White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	107.8240	10.28219	10.48648	0.0000
LOG(RY-1)	-2.997633	0.724677	-4.136511	0.0001
INEQ(-1)	-120.1045	23.03322	-5.214402	0.0000
POV(-1)	0.301759	0.093514	3.226872	0.0017
HHS	1.259473	1.327794	0.948546	0.3451
INWD	0.017970	0.053618	0.335141	0.7382
LIT	-0.235213	0.064885	-3.625055	0.0005
UNMP	0.301155	0.111989	2.689152	0.0084
R-squared	0.498059	Mean dependent var	60.18892	
Adjusted R-squared	0.463947	S.D. dependent var	16.82900	
S.E. of regression	12.32146	Akaike info criterion	7.929905	
Sum squared resid	15637.29	Schwarz criterion	8.125186	
Log likelihood	-432.1097	Hannan-Quinn criter.	8.009125	
F-statistic	14.60051	Durbin-Watson stat	2.028019	
Prob(F-statistic)	0.000000			

Source: Author's computation using sourced data

Appendix 7

First Difference Estimation Result of Growth

Dependent Variable: LOG(RY)

Method: Panel Generalized Method of Moments

Transformation: First Differences

Date: 03/16/14 Time: 14:25

Sample (adjusted): 2004 2010

Periods included: 2; s included: 37

Total panel (balanced) observations: 74

White period instrument weighting matrix

White period standard errors & covariance (d.f. corrected)

Instrument specification: @DYN(LOG(RY),-2) INEQ(-1) POV(-1) HHS UNMP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RY(-1))	0.183876	0.227943	0.806676	0.4226
INEQ(-1)	4.657011	2.660249	1.750592	0.0845
POV(-1)	0.022792	0.009762	2.334693	0.0225
HHS	0.160112	0.214520	0.746376	0.4580
UNMP	0.071445	0.011707	6.102617	0.0000

Effects Specification

Mean dependent var	0.996426	S.D. dependent var	1.179438
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S.E. of regression	1.355082	Sum squared resid	126.7010
J-statistic	14.71953	Instrument rank	7
Prob(J-statistic)	0.000636		

Source: Author's computation using sourced data

Appendix 8

First Difference Estimation Result of Inequality

Dependent Variable: INEQ

Method: Panel Generalized Method of Moments

Transformation: First Differences

Date: 03/16/14 Time: 14:32

Sample (adjusted): 2004 2010

Periods included: 2

s included: 37

Total panel (balanced) observations: 74

White period instrument weighting matrix

White period standard errors & covariance (d.f. corrected)

Instrument specification: @DYN(INEQ,-2) LOG(RY-1) POV(-1) LIT UNMP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INEQ(-1)	-0.041503	0.169517	-0.244832	0.8073
LOG(RY-1)	-0.022850	0.004564	-5.006164	0.0000
POV(-1)	-0.001065	0.000422	-2.524860	0.0139
LIT	0.001035	0.000488	2.120992	0.0375
UNMP	0.001300	0.000443	2.936688	0.0045

Effects Specification

Cross sectional fixed (first differences)

Mean dependent var	-0.012036	S.D. dependent var	0.083329
S.E. of regression	0.065749	Sum squared resid	0.298278
J-statistic	1.837631	Instrument rank	7
Prob(J-statistic)	0.398991		

Source: Author's computation using sourced data

Appendix 9

First Difference Estimation Result of Poverty

Dependent Variable: POV

Method: Panel Generalized Method of Moments

Transformation: First Differences

Date: 03/16/14 Time: 14:03

Sample (adjusted): 2004 2010

Periods included: 2

Cross sectionals included: 37

Total panel (balanced) observations: 74

White period instrument weighting matrix

White period standard errors & covariance (d.f. corrected)

Instrument specification: @DYN(POV,-2) LOG(RY-1) INEQ(-1) HHS INWD

LIT UNMP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POV(-1)	-0.355918	0.189753	-1.875686	0.0651
LOG(RY-1)	-2.846758	0.658183	-4.325175	0.0001
INEQ(-1)	-101.9214	20.10295	-5.069975	0.0000
HHS	3.958688	1.316699	3.006523	0.0037
INWD	-0.048618	0.065687	-0.740141	0.4618
LIT	0.089998	0.084667	1.062961	0.2916
UNMP	0.364708	0.058595	6.224186	0.0000

Effects Specification

Cross sectional fixed (first differences)

Mean dependent var	-1.378378	S.D. dependent var	19.67108
S.E. of regression	12.40335	Sum squared resid	10307.49
J-statistic	1.062356	Instrument rank	9
Prob(J-statistic)	0.587912		

Source: Author's computation using sourced data

Appendix 10

Fixed Effect Estimation Result for Growth

Dependent Variable: LOG(RY)

Method: Panel Least Squares

Date: 03/27/15 Time: 20:05

Sample (adjusted): 1996 2010

Periods included: 3

Cross sections included: 37

Total panel (balanced) observations: 111

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RY-1)	0.875675	0.010988	79.69371	0.0000
INEQ(-1)	0.109709	0.257029	0.426836	0.6708
POV(-1)	0.002269	0.000908	2.498684	0.0149
HHS	-0.016294	0.016244	-1.003116	0.3193
UNMP	0.005166	0.001326	3.896595	0.0002
C	0.418274	0.096171	4.349284	0.0000

Effects Specification

Cross section fixed (dummy variables)

STATEID	Effect
Abia	-0.001080
Adamawa	-0.009595
Akwa Ibom	0.048659
Anambra	0.029337
Bayelsa	0.158103
Bauchi	-0.165669
Benue	-0.004488
Borno	-0.013005
Cross Rivers	-0.026414
Delta	0.064990
Edo	0.005350
Enugu	-0.032299
Imo	-0.027020
Jigawa	-0.037754
Kaduna	0.003751
Kano	-0.044070
Kastina	-0.072636
Kebbi	-0.047684
Kogi	-0.086216
Kwara	-0.001970
Lagos	-0.011768
Niger	0.000271
Ogun	-0.000126
Ondo	-0.029756

Oyo	-0.039772
Platueau	0.027140
Rivers	0.078960
Sokoto	-0.086522
Taraba	-0.011732
Yobe	-0.042295
FCT	0.135832
Ebonyi	0.002654
Gombe	-0.047053
Nassarawa	0.350668
Osun	-0.017322
Zamfara	-0.082217
Ekiti	0.032749

R-squared	0.995414	Mean dependent var	4.220524
Adjusted R-squared	0.992689	S.D. dependent var	1.179506
S.E. of regression	0.100856	Akaike info criterion	-1.468916
Sum squared resid	0.701861	Schwarz criterion	-0.443688
Log likelihood	123.5248	Hannan-Quinn criter.	-1.053012
F-statistic	365.2672	Durbin-Watson stat	2.856904
Prob(F-statistic)	0.000000		

Source: Author's computation using sourced data

Appendix 11

Hausman Random Effect Test Result for Growth

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross sectional random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross sectional random	26.750386	5	0.0399

Cross sectional random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(RY-1)	0.875675	0.883904	0.000030	0.1360
POV(-1)	0.002269	0.001302	0.000000	0.0962
INEQ(-1)	0.109709	0.234020	0.021096	0.3921
HHS	-0.016294	-0.009211	0.000136	0.5430
UNMP	0.005166	0.003967	0.000000	0.0537

Cross sectional random effects test equation:

Dependent Variable: LOG(RY)

Method: Panel Least Squares

Date: 04/06/15 Time: 22:16

Sample (adjusted): 1996 2010

Periods included: 3

Cross sectionals included: 37

Total panel (balanced) observations: 111

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.418274	0.096171	4.349284	0.0000
LOG(RY-1)	0.875675	0.010988	79.69371	0.0000
POV(-1)	0.002269	0.000908	2.498684	0.0149
INEQ(-1)	0.109709	0.257029	0.426836	0.6708
HHS	-0.016294	0.016244	-1.003116	0.3193
UNMP	0.005166	0.001326	3.896595	0.0002

Effects Specification

Cross sectional fixed (dummy variables)

R-squared	0.995414	Mean dependent var	4.220524
Adjusted R-squared	0.992689	S.D. dependent var	1.179506
S.E. of regression	0.100856	Akaike info criterion	-1.468916
Sum squared resid	0.701861	Schwarz criterion	-0.443688
Log likelihood	123.5248	Hannan-Quinn criter.	-1.053012
F-statistic	365.2672	Durbin-Watson stat	2.856904
Prob(F-statistic)	0.000000		

Source: Author's computation using sourced data

Appendix 12

Fixed Effect Estimation Result for Inequality

Dependent Variable: INEQ

Method: Panel Least Squares

Date: 04/01/15 Time: 04:57

Sample (adjusted): 1996 2010

Periods included: 3

Cross sectionals included: 37

Total panel (balanced) observations: 111

Period SUR (PCSE) standard errors & covariance (d.f. corrected)

WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RY-1)	-0.020466	0.005677	-3.605053	0.0006
INEQ(-1)	-0.543193	0.129225	-4.203453	0.0001
POV(-1)	0.000425	0.000511	0.831402	0.4086
LIT	0.000359	0.000477	0.751198	0.4551
UNMP	0.000968	0.000679	1.425749	0.1584
C	0.652889	0.052266	12.49165	0.0000

Effect Specification

Cross sectional fixed (dummy variables)

STATEID	Effect
Abia	-0.015572
Adamawa	0.068283
Akwa Ibom	-0.002323
Anambra	0.019878
Bayelsa	0.006863
Bauchi	-0.051687
Benue	0.027933
Borno	-0.042581
Cross Rivers	0.005375
Delta	0.013144
Edo	-0.019349
Enugu	0.054672
Imo	0.000978
Jigawa	-0.145947
Kaduna	0.001623
Kano	-0.017280
Kastina	-0.011486
Kebbi	-0.111676
Kogi	0.034904
Kwara	0.047568
Lagos	0.024042

Niger	-0.010209
Ogun	0.053926
Ondo	-0.029019
Oyo	-0.008420
Platueau	0.042199
Rivers	0.093781
Sokoto	-0.046804
Taraba	0.044454
Yobe	0.006741
FCT	0.144084
Ebonyi	0.008851
Gombe	-0.003109
Nassarawa	-0.045659
Osun	-0.065664
Zamfara	-0.075429
Ekiti	0.002916

R-squared	0.667230	Mean dependent var	0.407625
Adjusted R-squared	0.469498	S.D. dependent var	0.058046
S.E. of regression	0.042278	Akaike info criterion	-3.207754
Sum squared resid	0.123334	Schwarz criterion	-2.182526
Log likelihood	220.0303	Hannan-Quinn criter.	-2.791849
F-statistic	3.374405	Durbin-Watson stat	2.525599
Prob(F-statistic)	0.000004		

Source: Author's computation using sourced data

Appendix 13

Hausman Random Effect Test Result for Inequality

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross sectional random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross sectional random	89.617888	5	0.0000

Cross sectional random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(RY-1)	-0.020466	-0.013520	0.000007	0.0065
POV(-1)	0.000425	-0.000443	0.000000	0.0168
INEQ(-1)	-0.543193	-0.058222	0.005780	0.0000
LIT	0.000359	0.000750	0.000000	0.2229
UNMP	0.000968	0.000430	0.000000	0.0977

Cross sectional random effects test equation:

Dependent Variable: INEQ
Method: Panel Least Squares
Date: 04/06/15 Time: 22:21
Sample (adjusted): 1996 2010
Periods included: 3
Cross sectionals included: 37
Total panel (balanced) observations: 111

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.652889	0.044479	14.67856	0.0000
LOG(RY-1)	-0.020466	0.004572	-4.476449	0.0000
POV(-1)	0.000425	0.000431	0.986174	0.3275
INEQ(-1)	-0.543193	0.111670	-4.864268	0.0000
LIT	0.000359	0.000379	0.946500	0.3472
UNMP	0.000968	0.000559	1.731474	0.0878

Effects Specification

Cross sectional fixed (dummy variables)

R-squared	0.667230	Mean dependent var	0.407625
Adjusted R-squared	0.469498	S.D. dependent var	0.058046
S.E. of regression	0.042278	Akaike info criterion	-3.207754
Sum squared resid	0.123334	Schwarz criterion	-2.182526
Log likelihood	220.0303	Hannan-Quinn criter.	-2.791849
F-statistic	3.374405	Durbin-Watson stat	2.525599
Prob(F-statistic)	0.000004		

Source: Author's computation using sourced data

Appendix 14

Fixed Effect Estimation Result for Poverty

Dependent Variable: POV

Method: Panel Least Squares

Date: 04/06/15 Time: 22:25

Sample (adjusted): 1996 2010

Periods included: 3

Cross sectionals included: 37

Total panel (balanced) observations: 111

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RY-1)	-3.276274	1.003013	-3.266433	0.0017
POV(-1)	-0.318712	0.098214	-3.245084	0.0018
INEQ(-1)	-81.38190	24.64419	-3.302276	0.0015
LIT	0.079321	0.095711	0.828762	0.4102
HHS	3.768599	1.524171	2.472557	0.0160
INDW	0.020527	0.076035	0.269974	0.7880
UNMP	0.298037	0.121124	2.460602	0.0165
C	96.71826	10.57102	9.149378	0.0000

Effects Specification

Cross sectional fixed (dummy variables)

STATEID	Effect
Abia	-16.10986
Adamawa	10.72324
Akwa Ibom	-7.113754
Anambra	-25.59524
Bayelsa	-27.45876
Bauchi	21.60427
Benue	0.538842
Borno	-11.45510
Cross Rivers	-10.33985
Delta	-3.244055
Edo	-13.41723
Enugu	-13.75600
Imo	-19.39953
Jigawa	18.41030
Kaduna	-10.32466
Kano	-5.647228
Kastina	10.33024
Kebbi	20.85199
Kogi	34.67411
Kwara	26.73162
Lagos	-0.740777
Niger	-11.20938
Ogun	1.877078

Ondo	-5.298417
Oyo	-22.08216
Platueau	8.143537
Rivers	-17.14533
Sokoto	21.81936
Taraba	2.312819
Yobe	27.13789
FCT	-0.203500
Ebonyi	-7.264127
Gombe	19.62254
Nassarawa	6.426900
Osun	-5.862144
Zamfara	9.139637
Ekiti	-6.677270

R-squared	0.820600	Mean dependent var	60.18892
Adjusted R-squared	0.705463	S.D. dependent var	16.82900
S.E. of regression	9.133315	Akaike info criterion	7.549690
Sum squared resid	5588.969	Schwarz criterion	8.623738
Log likelihood	-375.0078	Hannan-Quinn criter.	7.985399
F-statistic	7.127141	Durbin-Watson stat	2.862280
Prob(F-statistic)	0.000000		

Source: Author's computation using sourced data

Appendix 15

Hausman Random Effect Test Result for Poverty

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross sectional random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross sectional random	99.226118	7	0.0000

Cross sectional random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(RY-1)	-3.276274	-2.997633	0.325827	0.6254
POV(-1)	-0.318712	0.301759	0.006600	0.0000
INEQ(-1)	-81.381904	-120.104488	292.939446	0.0237
LIT	0.079321	-0.235213	0.006540	0.0001
HHS	3.768599	1.259473	1.393313	0.0335
INDW	0.020527	0.017970	0.003748	0.9667
UNMP	0.298037	0.301155	0.004937	0.9646

Cross sectional random effects test equation:

Dependent Variable: POV

Method: Panel Least Squares

Date: 04/06/15 Time: 22:27

Sample (adjusted): 1996 2010

Periods included: 3

Cross sectionals included: 37

Total panel (balanced) observations: 111

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	96.71826	10.57102	9.149378	0.0000
LOG(RY-1)	-3.276274	1.003013	-3.266433	0.0017
POV(-1)	-0.318712	0.098214	-3.245084	0.0018
INEQ(-1)	-81.38190	24.64419	-3.302276	0.0015
LIT	0.079321	0.095711	0.828762	0.4102
HHS	3.768599	1.524171	2.472557	0.0160
INDW	0.020527	0.076035	0.269974	0.7880
UNMP	0.298037	0.121124	2.460602	0.0165

Effects Specification

Cross sectional fixed (dummy variables)

R-squared	0.820600	Mean dependent var	60.18892
Adjusted R-squared	0.705463	S.D. dependent var	16.82900
S.E. of regression	9.133315	Akaike info criterion	7.549690
Sum squared resid	5588.969	Schwarz criterion	8.623738
Log likelihood	-375.0078	Hannan-Quinn criter.	7.985399

F-statistic	7.127141	Durbin-Watson stat	2.862280
Prob(F-statistic)	0.000000		

Source: Author's computation using sourced data

Appendix 16

Cross Sectional Dependence Test for Growth

PESARAN TEST

. . xtcsd, pesaran show

Correlation matrix of residuals:

	c1	c2	c3	c4	c5	c6	c7	c8	c9
c10	c11	c12	c13	c14					
r1	1.0000								
r2	-0.4098	1.0000							
r3	0.9290	-0.6024	1.0000						
r4	0.9922	-0.4525	0.8934	1.0000					
r5	0.9597	-0.3018	0.9426	0.8702	1.0000				
r6	0.0106	0.8636	-0.4990	-0.1504	-0.2442	1.0000			
r7	0.7648	0.5463	0.1944	0.4901	0.4509	0.7516	1.0000		
r8	0.0834	-0.3351	0.4033	-0.0481	0.3579	-0.7397	-0.4905	1.0000	
r9	0.9170	0.6922	0.0894	0.0302	0.4020	0.4415	0.6151	0.2403	1.0000
r10	0.5743	-0.5328	0.8294	0.4936	0.7780	-0.7236	-0.1635	0.8450	0.2269
r11	0.7684	-0.5782	0.9494	0.7104	0.8979	-0.6373	0.0144	0.6688	0.1856
r12	-0.6526	-0.9151	0.3567	0.3645	0.0380	-0.6351	-0.4926	-0.0464	-0.8986
r13	0.5236	0.3117	0.3206	0.0468	0.5256	-0.0689	0.2207	0.6964	0.8624
r14	-0.8765	0.6620	-0.9927	-0.8389	-0.9106	0.5973	-0.0792	-0.4916	-0.0448
r15	0.9998	-0.0022	0.7895	0.8377	0.9392	0.1036	0.7284	0.1072	0.5710
r16	0.9478	-0.1780	0.8886	0.7984	0.9886	-0.1780	0.4927	0.3974	0.5323
r17	-0.1772	0.7088	-0.5999	-0.1964	-0.4325	0.9443	0.5948	-0.9016	0.1223
r18	0.1334	0.7183	-0.3754	0.0327	-0.1608	0.9707	0.8000	-0.8508	0.3048
r19	0.6370	0.2750	0.4116	0.1618	0.6177	-0.0622	0.2946	0.6654	0.8671
r20	0.8768	0.2737	0.5431	0.4040	0.7696	0.0729	0.5378	0.4695	0.8801
r21	-0.0546	0.2094	0.0470	-0.3419	0.1607	-0.2934	-0.2400	0.8501	0.6106
r22	0.7269	0.2981	0.4403	0.2271	0.6602	-0.0013	0.3832	0.5998	0.8900
r23	-0.7904	0.9821	-0.7001	-0.6069	-0.4236	0.7788	0.3795	-0.2450	0.6385
r24	0.8451	-0.0170	0.7494	0.5636	0.8946	-0.1798	0.4017	0.5815	0.7054
r25	0.4122	0.3691	0.2167	-0.0658	0.4264	-0.0437	0.1723	0.6951	0.8622
r26	0.9992	0.1071	0.7252	0.7639	0.9090	0.1683	0.7585	0.1247	0.6682
r27	0.9701	-0.8990	0.8252	0.7948	0.6054	-0.6380	-0.1248	0.1585	-0.4850
r28	0.3598	0.9490	-0.3766	-0.3261	-0.0498	0.7258	0.5751	-0.0756	0.8805
r29	-0.2390	-0.3021	-0.9920	0.5919	0.4284				

r29	0.8194	0.8188	-0.0463	0.1202	0.2844	0.7857	0.8805	-0.2478	0.8786
	-0.1500	-0.0914	-0.8453	0.5227	0.1369				
r30	-0.1597	0.6191	-0.2156	-0.4583	0.0147	0.1571	0.0716	0.5323	0.8151
	0.2192	0.0293	-0.8587	0.8546	0.1945				
r31	-0.1558	0.9826	-0.5660	-0.3397	-0.2689	0.9414	0.6533	-0.4868	0.6380
	-0.6046	-0.6010	-0.8485	0.1982	0.6428				
r32	0.8530	-0.3771	0.9363	0.7477	0.9654	-0.4336	0.2405	0.5879	0.3926
	0.9126	0.9692	0.0445	0.6327	-0.9343				
r33	0.9188	0.2622	0.5760	0.4691	0.8027	0.1037	0.5941	0.4096	0.8656
	0.6090	0.6328	-0.5581	0.8737	-0.5370				
r34	0.9820	-0.1065	0.8577	0.8289	0.9795	-0.0568	0.6028	0.2710	0.5512
	0.6805	0.8049	-0.1395	0.5880	-0.8086				
r35	0.4956	0.2366	0.3639	0.0655	0.5465	-0.1492	0.1621	0.7487	0.8194
	0.6880	0.5720	-0.6076	0.9967	-0.3819				
r36	0.8333	0.6044	0.1953	0.4369	0.4788	0.7314	0.9872	-0.3696	0.7327
	-0.0866	0.0593	-0.6023	0.3676	-0.0871				
r37	0.9187	-0.0035	0.7784	0.6567	0.9323	-0.0942	0.5148	0.4576	0.6946
	0.7510	0.8075	-0.3086	0.7823	-0.7470				

	c15	c16	c17	c18	c19	c20	c21	c22	c23
c24	c25	c26	c27	c28					
r15	1.0000								
r16	0.9514	1.0000							
r17	-0.1100	-0.4054	1.0000						
r18	0.1781	-0.1268	0.9581	1.0000					
r19	0.6141	0.7224	-0.3871	-0.1889	1.0000				
r20	0.8171	0.8568	-0.2477	0.0031	0.9523	1.0000			
r21	0.0640	0.2705	-0.5387	-0.4938	0.8185	0.6042	1.0000		
r22	0.6791	0.7627	-0.3295	-0.1141	0.9952	0.9768	0.7600	1.0000	
r23	-0.1567	-0.2947	0.6380	0.6054	0.2545	0.1968	0.3006	0.2597	1.0000
r24	0.8554	0.9473	-0.4657	-0.2066	0.9039	0.9570	0.5568	0.9233	-0.0933
	1.0000								
r25	0.4248	0.5477	-0.3604	-0.2137	0.9739	0.8675	0.9109	0.9530	0.3855
	0.7856	1.0000							
r26	0.9923	0.9397	-0.0726	0.2158	0.6829	0.8706	0.1436	0.7459	-0.0420
	0.8775	0.5104	1.0000						
r27	0.3930	0.4822	-0.5423	-0.4431	-0.1525	-0.0261	-0.3553	-0.1342	-0.9646
	0.2478	-0.3282	0.2803	1.0000					
r28	0.2081	0.0903	0.4860	0.5614	0.5639	0.5506	0.4416	0.5833	0.9248
	0.2853	0.6339	0.3240	-0.8173	1.0000				
r29	0.5711	0.3898	0.5439	0.7158	0.5501	0.6739	0.1724	0.6088	0.7116
	0.4570	0.5156	0.6541	-0.5048	0.8888				
r30	0.0739	0.1588	-0.1142	-0.0672	0.7944	0.6269	0.8972	0.7595	0.6804
	0.4586	0.9064	0.1869	-0.6812	0.7871				
r31	0.0587	-0.1614	0.8120	0.8345	0.1781	0.2300	0.0387	0.2169	0.9368
	-0.0554	0.2438	0.1553	-0.8251	0.9041				
r32	0.8372	0.9631	-0.6353	-0.3880	0.7045	0.7821	0.3631	0.7227	-0.4569
	0.9278	0.5454	0.8130	0.5877	-0.0886				
r33	0.8617	0.8828	-0.2097	0.0520	0.9225	0.9963	0.5333	0.9547	0.1708
	0.9574	0.8218	0.9093	0.0161	0.5319				
r34	0.9847	0.9905	-0.2794	0.0067	0.6789	0.8464	0.1771	0.7309	-0.2418
	0.9161	0.4948	0.9739	0.4533	0.1386				
r35	0.5104	0.6526	-0.4637	-0.2937	0.9901	0.9011	0.8888	0.9716	0.2422
	0.8609	0.9876	0.5810	-0.1757	0.5262				
r36	0.7504	0.5406	0.5309	0.7466	0.4331	0.6464	-0.0826	0.5142	0.4490
	0.4960	0.3249	0.7953	-0.1974	0.6695				
r37	0.9240	0.9760	-0.3693	-0.0936	0.8497	0.9482	0.4319	0.8833	-0.1053
	0.9884	0.7079	0.9391	0.2892	0.2807				

	c29	c30	c31	c32	c33	c34	c35	c36	c37
r29	1.0000								
r30	0.5212	1.0000							
r31	0.8459	0.4760	1.0000						
r32	0.1557	0.1405	-0.3894	1.0000					
r33	0.6927	0.5660	0.2342	0.7947	1.0000				
r34	0.4717	0.1171	-0.0692	0.9190	0.8814	1.0000			
r35	0.4560	0.8310	0.1188	0.6669	0.8607	0.5930	1.0000		
r36	0.9352	0.2244	0.6859	0.2957	0.6922	0.6389	0.3089	1.0000	
r37	0.5123	0.3663	-0.0143	0.9263	0.9615	0.9633	0.7873	0.5914	1.0000

Pesaran's test of cross sectional independence = 15.728, Pr = 0.0000

Source: Author's computation using sourced data

FRIEDMA TEST

xtcsd, friedman show abs

Correlation matrix of residuals:

	c1	c2	c3	c4	c5	c6	c7	c8	c9
c10	c11	c12	c13	c14					
r1	1.0000								
r2	-0.4098	1.0000							
r3	0.9290	-0.7182	1.0000						
r4	0.9922	-0.2929	0.8757	1.0000					
r5	0.9597	-0.6497	0.9956	0.9171	1.0000				
r6	0.0106	0.9078	-0.3601	0.1351	-0.2709	1.0000			
r7	0.7648	0.2743	0.4722	0.8391	0.5528	0.6524	1.0000		
r8	0.0834	-0.9432	0.4462	-0.0415	0.3602	-0.9956	-0.5783	1.0000	
r9	0.9170	-0.7396	0.9995	0.8602	0.9922	-0.3891	0.4444	0.4739	1.0000
r10	0.5743	-0.9821	0.8364	0.4678	0.7813	-0.8125	-0.0883	0.8637	0.8531
r11	0.7684	-0.8987	0.9506	0.6826	0.9173	-0.6318	0.1753	0.7018	0.9599
r12	-0.6526	0.9586	-0.8867	-0.5531	-0.8393	0.7507	-0.0110	-0.8095	-0.9007
r13	0.5236	-0.9917	0.8017	0.4133	0.7420	-0.8464	-0.1485	0.8927	0.8199
r14	-0.8765	0.7983	-0.9924	-0.8096	-0.9765	0.4721	-0.3601	-0.5529	-0.9958
r15	0.9998	-0.4289	0.9366	0.9894	0.9654	-0.0105	0.7510	0.1044	0.9253
r16	0.9478	-0.6793	0.9985	0.9007	0.9992	-0.3088	0.5194	0.3968	0.9963
r17	-0.1772	0.9704	-0.5288	-0.0532	-0.4468	0.9822	0.4985	-0.9955	-0.5550
r18	0.1334	0.8494	-0.2428	0.2558	-0.1507	0.9924	0.7405	-0.9765	-0.2730
r19	0.6370	-0.9642	0.8770	0.5360	0.8280	-0.7641	-0.0095	0.8213	0.8916
r20	0.8768	-0.7979	0.9925	0.8100	0.9766	-0.4715	0.3608	0.5523	0.9958
r21	-0.0546	-0.8885	0.3187	-0.1786	0.2283	-0.9990	-0.6851	0.9905	0.3482
r22	0.7269	-0.9243	0.9294	0.6357	0.8907	-0.6789	0.1136	0.7449	0.9405
r23	-0.7904	0.8827	-0.9610	-0.7079	-0.9307	0.6042	-0.2098	-0.6764	-0.9691
r24	0.8451	-0.8339	0.9829	0.7719	0.9613	-0.5256	0.3019	0.6032	0.9882
r25	0.4122	-1.0000	0.7200	0.2954	0.6517	-0.9067	-0.2717	0.9423	0.7414
r26	0.9992	-0.4454	0.9429	0.9865	0.9700	-0.0288	0.7388	0.1226	0.9320
r27	0.9701	-0.6188	0.9910	0.9323	0.9992	-0.2323	0.5857	0.3226	0.9864
r28	0.3598	0.7037	-0.0109	0.4733	0.0830	0.9368	0.8763	-0.8998	-0.0422
r29	0.8194	0.1871	0.5492	0.8845	0.6252	0.5818	0.9960	-0.5028	0.5229
r30	-0.1597	-0.8351	0.2169	-0.2814	0.1243	-0.9888	-0.7581	0.9704	0.2473

r31	-0.1558	0.9649	-0.5102	-0.0315	-0.4273	0.9861	0.5172	-0.9973	-0.5368
	-0.8982	-0.7519	0.8501	-0.9232	0.6122				
r32	0.8530	-0.8256	0.9856	0.7813	0.9653	-0.5129	0.3161	0.5913	0.9904
	0.9171	0.9895	-0.9522	0.8913	-0.9989				
r33	0.9188	-0.7366	0.9996	0.8624	0.9927	-0.3851	0.4483	0.4701	1.0000
	0.8508	0.9586	-0.8988	0.8174	-0.9954				
r34	0.9820	-0.5746	0.9822	0.9508	0.9955	-0.1783	0.6294	0.2700	0.9758
	0.7185	0.8754	-0.7839	0.6750	-0.9516				
r35	0.4956	-0.9954	0.7818	0.3835	0.7198	-0.8633	-0.1806	0.9069	0.8009
	0.9957	0.9367	-0.9815	0.9995	-0.8525				
r36	0.8333	0.1628	0.5697	0.8957	0.6443	0.5616	0.9935	-0.4814	0.5437
	0.0260	0.2865	-0.1250	-0.0346	-0.4642				
r37	0.9187	-0.7367	0.9996	0.8623	0.9927	-0.3852	0.4482	0.4702	1.0000
	0.8509	0.9587	-0.8988	0.8175	-0.9954				

	c15	c16	c17	c18	c19	c20	c21	c22	c23
c24	c25	c26	c27	c28					
r15	1.0000								
r16	0.9543	1.0000							
r17	-0.1980	-0.4818	1.0000						
r18	0.1124	-0.1897	0.9518	1.0000					
r19	0.6531	0.8496	-0.8715	-0.6790	1.0000				
r20	0.8868	0.9844	-0.6286	-0.3596	0.9292	1.0000			
r21	-0.0335	0.2667	-0.9730	-0.9969	0.7349	0.4323	1.0000		
r22	0.7413	0.9080	-0.8046	-0.5836	0.9924	0.9676	0.6460	1.0000	
r23	-0.8032	-0.9445	0.7430	0.5017	-0.9757	-0.9876	-0.5686	-0.9952	1.0000
r24	0.8562	0.9715	-0.6759	-0.4171	0.9504	0.9981	0.4876	0.9814	-0.9955
	1.0000								
r25	0.4314	0.6812	-0.9697	-0.8480	0.9649	0.7995	0.8872	0.9253	-0.8839
	0.8354	1.0000							
r26	0.9998	0.9596	-0.2159	0.0942	0.6669	0.8951	-0.0152	0.7535	-0.8139
	0.8656	0.4478	1.0000						
r27	0.9750	0.9968	-0.4106	-0.1110	0.8050	0.9672	0.1892	0.8718	-0.9154
	0.9496	0.6209	0.9789	1.0000					
r28	0.3400	0.0435	0.8545	0.9727	-0.4901	-0.1332	-0.9513	-0.3791	0.2872
	-0.1947	-0.7018	0.3227	0.1227	1.0000				
r29	0.8071	0.5939	0.4189	0.6773	0.0801	0.4429	-0.6170	0.2021	-0.2965
	0.3861	-0.1844	0.7962	0.6559	0.8296				
r30	-0.1388	0.1635	-0.9433	-0.9996	0.6593	0.3347	0.9944	0.5618	-0.4785
	0.3928	0.8336	-0.1206	0.0845	-0.9785				
r31	-0.1767	-0.4627	0.9998	0.9582	-0.8607	-0.6116	-0.9778	-0.7916	0.7283
	-0.6597	-0.9642	-0.1947	-0.3908	0.8656				
r32	0.8638	0.9749	-0.6649	-0.4035	0.9457	0.9989	0.4746	0.9785	-0.9939
	0.9999	0.8271	0.8729	0.9541	-0.1801				
r33	0.9269	0.9967	-0.5514	-0.2688	0.8896	0.9954	0.3441	0.9390	-0.9680
	0.9875	0.7384	0.9336	0.9871	-0.0378				
r34	0.9858	0.9909	-0.3598	-0.0561	0.7711	0.9518	0.1349	0.8435	-0.8918
	0.9308	0.5768	0.9887	0.9985	0.1772				
r35	0.5138	0.7467	-0.9426	-0.7947	0.9852	0.8522	0.8402	0.9567	-0.9238
	0.8831	0.9956	0.5295	0.6915	-0.6321				
r36	0.8215	0.6135	0.3964	0.6590	0.1047	0.4648	-0.5974	0.2262	-0.3200
	0.4088	-0.1601	0.8109	0.6744	0.8156				
r37	0.9268	0.9967	-0.5515	-0.2689	0.8897	0.9954	0.3442	0.9391	-0.9681
	0.9875	0.7385	0.9336	0.9871	-0.0379				

	c29	c30	c31	c32	c33	c34	c35	c36	c37
r29	1.0000								
r30	-0.6967	1.0000							
r31	0.4385	-0.9502	1.0000						
r32	0.3998	0.3791	-0.6485	1.0000					
r33	0.5266	0.2431	-0.5332	0.9898	1.0000				
r34	0.6965	0.0295	-0.3395	0.9362	0.9768	1.0000			
r35	-0.0917	0.7783	-0.9352	0.8761	0.7982	0.6506	1.0000		
r36	0.9997	-0.6787	0.4162	0.4223	0.5474	0.7140	-0.0671	1.0000	
r37	0.5265	0.2432	-0.5333	0.9898	1.0000	0.9767	0.7983	0.5473	1.0000

Friedman's test of cross sectional independence = 13.622, Pr = 0.9997

Average absolute value of the off-diagonal elements = 0.690

Source: Author's computation using sourced data

Appendix 17 Cross Sectional Dependence Test For Poverty

PESARAN TEST

. xtcsd, pesaran show

Correlation matrix of residuals:

	c1	c2	c3	c4	c5	c6	c7	c8	c9
c10	c11	c12	c13	c14					
r1	1.0000								
r2	-0.6551	1.0000							
r3	0.9466	-0.5853	1.0000						
r4	0.3754	-0.1899	0.1574	1.0000					
r5	0.9108	-0.8733	0.9052	0.2261	1.0000				
r6	0.2203	0.4765	0.1111	-0.7844	-0.2068	1.0000			
r7	0.3171	0.9381	-0.2704	-0.2010	-0.6536	0.6441	1.0000		
r8	0.6524	-0.9359	0.3186	0.3678	0.6869	-0.7367	-0.9842	1.0000	
r9	0.9791	-0.0590	0.8438	0.0527	0.5361	0.4635	0.2884	-0.2302	1.0000
r10	0.5682	0.7149	-0.0067	0.3644	-0.3616	0.2311	0.8244	-0.7114	0.4571
1.0000									
r11	0.5998	-0.0589	0.3371	0.9399	0.2635	-0.5299	0.0330	0.1444	0.3615
0.5925	1.0000								
r12	0.0393	0.7103	-0.3744	0.5561	-0.5723	-0.1537	0.6535	-0.5315	-0.0021
0.8711	0.6272	1.0000							
r13	0.9999	-0.7510	0.9042	0.4967	0.9453	-0.3235	-0.5218	0.6099	0.6112
-0.0883	0.5617	-0.2741	1.0000						
r14	-0.1847	0.7870	-0.2163	-0.6600	-0.5587	0.9161	0.8651	-0.9349	0.2627
0.4567	-0.4324	0.1963	-0.5949	1.0000					
r15	-0.5342	0.9727	-0.6654	0.0041	-0.9004	0.2596	0.8631	-0.8349	-0.1788
0.7311	0.0833	0.8250	-0.7330	0.6223					
r16	-0.4873	0.9369	-0.6891	0.1097	-0.8925	0.1395	0.8061	-0.7639	-0.2333
0.7275	0.1611	0.8697	-0.7036	0.5216					
r17	-0.5200	0.9934	-0.4899	-0.2015	-0.8134	0.5421	0.9716	-0.9658	0.0544
0.7580	-0.0346	0.6976	-0.6879	0.8264					
r18	-0.2277	0.6906	-0.1957	-0.7791	-0.5006	0.9502	0.7654	-0.8612	0.2265
0.2993	-0.5706	0.0291	-0.5930	0.9849					
r19	-0.2194	0.8506	-0.2491	-0.5625	-0.6079	0.8671	0.9219	-0.9726	0.2628
0.5587	-0.3308	0.3202	-0.6030	0.9917					
r20	-0.9587	0.9126	-0.8388	-0.3526	-0.9850	0.3726	0.7339	-0.7817	-0.4264
0.3841	-0.3431	0.5160	-0.9536	0.6917					
r21	-0.7340	0.8038	-0.8982	0.0867	-0.9493	-0.0731	0.5607	-0.5452	-0.5784
0.4388	0.0102	0.7370	-0.8159	0.3255					
r22	-0.4270	0.3187	-0.2315	-0.9911	-0.3366	0.8216	0.3208	-0.4816	-0.0593
-0.2552	-0.9155	-0.4408	-0.5813	0.7436					
r23	0.9685	0.6491	0.2133	-0.2859	-0.2182	0.8146	0.8694	-0.8581	0.6952
0.7353	0.0418	0.3520	-0.1366	0.8435					
r24	0.6060	-0.4609	0.8146	-0.4423	0.7099	0.5302	-0.1764	0.1195	0.7070
-0.2669	-0.2587	-0.7001	0.5412	0.1518					
r25	0.9258	-0.7985	0.9550	0.2102	0.9905	-0.1094	-0.5434	0.5825	0.6471
-0.2535	0.2944	-0.5192	0.9525	-0.4605					
r26	-0.4534	0.9919	-0.5641	-0.0646	-0.8522	0.3903	0.9321	-0.9077	-0.0402
0.7796	0.0650	0.7935	-0.6923	0.7194					
r27	0.9527	-0.8946	0.5810	0.6063	0.8304	-0.7169	-0.8340	0.9101	0.1165
-0.3916	0.4875	-0.3222	0.8571	-0.9202					
r28	0.2445	0.6909	-0.0384	-0.6590	-0.4028	0.9619	0.8277	-0.8930	0.4186
0.4517	-0.3951	0.1173	-0.4454	0.9838					

r29	0.5996	0.8702	-0.1287	0.0080	-0.5269	0.5304	0.9712	-0.9156	0.4149
	0.9323	0.2624	0.7470	-0.3356	0.7458				
r30	-0.2310	0.2082	-0.0438	-0.9880	-0.1673	0.8619	0.2706	-0.4269	0.0992
	-0.2701	-0.8774	-0.5305	-0.4203	0.7170				
r31	-0.1471	-0.9516	0.3077	0.1691	0.6818	-0.6056	-0.9986	0.9787	-0.2508
	-0.8335	-0.0531	-0.6874	0.5405	-0.8447				
r32	0.3287	0.1023	0.0354	0.9554	0.0005	-0.6217	0.0937	0.0788	0.0958
	0.6077	0.9524	0.7721	0.3144	-0.4159				
r33	0.6640	-0.4874	0.8586	-0.3693	0.7523	0.4850	-0.1920	0.1485	0.7426
	-0.2356	-0.1817	-0.6698	0.6033	0.1054				
r34	0.8037	-0.7165	0.9509	-0.0604	0.9364	0.1495	-0.4365	0.4351	0.7003
	-0.2941	0.0659	-0.6431	0.8356	-0.2379				
r35	0.9996	-0.0767	0.8418	0.2352	0.5502	0.3126	0.2586	-0.1707	0.9829
	0.5250	0.5268	0.1134	0.6759	0.1453				
r36	0.0931	0.5126	0.0302	-0.8150	-0.2748	0.9964	0.6536	-0.7539	0.3882
	0.2100	-0.5779	-0.1457	-0.3994	0.9331				
r37	0.7550	-0.3982	0.8906	-0.2983	0.7277	0.5158	-0.0763	0.0533	0.8396
	-0.0790	-0.0708	-0.5426	0.6233	0.1617				

	c15	c16	c17	c18	c19	c20	c21	c22	c23
c24	c25	c26	c27	c28					
r15	1.0000								
r16	0.9924	1.0000							
r17	0.9490	0.9051	1.0000						
r18	0.5064	0.3972	0.7284	1.0000					
r19	0.7059	0.6141	0.8881	0.9549	1.0000				
r20	0.9001	0.8713	0.8673	0.6425	0.7297	1.0000			
r21	0.8992	0.9281	0.7335	0.2336	0.4045	0.8875	1.0000		
r22	0.1277	0.0210	0.3289	0.8455	0.6580	0.4641	0.0253	1.0000	
r23	0.5031	0.4178	0.7315	0.7773	0.8656	0.3510	0.0784	0.3636	1.0000
r24	-0.6436	-0.7244	-0.3706	0.2463	0.0615	-0.5798	-0.8844	0.3644	0.3133
	1.0000								
r25	-0.8430	-0.8450	-0.7258	-0.4135	-0.5052	-0.9587	-0.9524	-0.3112	-0.0834
	0.7579	1.0000							
r26	0.9874	0.9638	0.9852	0.6057	0.7966	0.8774	0.8209	0.1966	0.6326
	-0.5161	-0.7767	1.0000						
r27	-0.7906	-0.7166	-0.8895	-0.8978	-0.9276	-0.9141	-0.6352	-0.7064	-0.6209
	0.2043	0.7679	-0.8308	1.0000					
r28	0.5059	0.3976	0.7484	0.9749	0.9673	0.5519	0.1620	0.7295	0.8964
	0.3121	-0.2942	0.6239	-0.8353	1.0000				
r29	0.8207	0.7792	0.9146	0.6206	0.8205	0.5937	0.4929	0.1098	0.8771
	-0.1724	-0.4089	0.8915	-0.6794	0.7287				
r30	-0.0031	-0.1170	0.2369	0.8266	0.6222	0.3106	-0.1510	0.9820	0.4086
	0.5329	-0.1324	0.0867	-0.6088	0.7370				
r31	-0.8880	-0.8363	-0.9801	-0.7402	-0.9063	-0.7539	-0.6010	-0.2919	-0.8438
	0.2286	0.5751	-0.9494	0.8322	-0.7996				
r32	0.2827	0.3753	0.0955	-0.5669	-0.2986	-0.1099	0.2918	-0.9086	-0.0536
	-0.5408	0.0134	0.2275	0.3525	-0.4341				
r33	-0.6601	-0.7349	-0.3942	0.1916	0.0211	-0.6280	-0.9057	0.2903	0.3078
	0.9968	0.8018	-0.5332	0.2601	0.2717				
r34	-0.8222	-0.8575	-0.6331	-0.1650	-0.3065	-0.8618	-0.9874	-0.0389	0.0642
	0.9090	0.9605	-0.7273	0.5822	-0.0645				
r35	-0.1575	-0.1915	0.0314	0.0862	0.1647	-0.4664	-0.5341	-0.2378	0.6342
	0.5985	0.6565	-0.0351	0.2123	0.2958				
r36	0.2996	0.1802	0.5701	0.9697	0.8837	0.4365	-0.0107	0.8560	0.7883
	0.4755	-0.1830	0.4222	-0.7632	0.9649				
r37	-0.5690	-0.6440	-0.2956	0.2233	0.0931	-0.5991	-0.8658	0.2338	0.4241
	0.9770	0.7952	-0.4322	0.2246	0.3329				

	c29	c30	c31	c32	c33	c34	c35	c36	c37
r29	1.0000								
r30	0.0810	1.0000							
r31	-0.9715	-0.2336	1.0000						
r32	0.2919	-0.9288	-0.1276	1.0000					
r33	-0.1688	0.4653	0.2433	-0.4729	1.0000				
r34	-0.3515	0.1462	0.4789	-0.2320	0.9349	1.0000			
r35	0.4197	-0.0847	-0.2281	0.2735	0.6463	0.6591	1.0000		
r36	0.5243	0.8817	-0.6176	-0.6463	0.4254	0.0800	0.2341	1.0000	
r37	-0.0300	0.4125	0.1271	-0.3689	0.9871	0.9192	0.7555	0.4502	1.0000

Pesaran's test of cross sectional independence = 5.485, Pr = 0.0000

Source: Author's computation using sourced data

FRIEDMA'S TEST

. xtcsd, friedman show abs

Correlation matrix of residuals:

	c1	c2	c3	c4	c5	c6	c7	c8	c9
c10	c11	c12	c13	c14					
r1	1.0000								
r2	-0.6551	1.0000							
r3	0.9466	-0.8637	1.0000						
r4	0.3754	0.4543	0.0565	1.0000					
r5	0.9108	-0.9086	0.9953	-0.0407	1.0000				
r6	0.2203	-0.8813	0.5230	-0.8214	0.6033	1.0000			
r7	0.3171	0.5087	-0.0056	0.9981	-0.1026	-0.8552	1.0000		
r8	0.6524	-1.0000	0.8619	-0.4575	0.9071	0.8829	-0.5118	1.0000	
r9	0.9791	-0.7950	0.9924	0.1792	0.9757	0.4139	0.1178	0.7928	1.0000
r10	0.5682	0.2494	0.2726	0.9760	0.1779	-0.6775	0.9606	-0.2529	0.3892
r11	0.5998	0.2115	0.3098	0.9668	0.2161	-0.6483	0.9491	-0.2150	0.4247
r12	0.0393	0.7291	-0.2849	0.9409	-0.3766	-0.9660	0.9601	-0.7316	-0.1645
r13	0.9999	-0.6678	0.9519	0.3597	0.9177	0.2367	0.3011	0.6651	0.9824
r14	-0.1847	-0.6215	0.1420	-0.9803	0.2374	0.9180	-0.9906	0.6243	0.0188
r15	-0.5342	0.9887	-0.7782	0.5830	-0.8355	-0.9423	0.6323	-0.9892	-0.6948
r16	-0.4873	0.9790	-0.7428	0.6265	-0.8042	-0.9591	0.6737	-0.9797	-0.6545
r17	-0.5200	0.9860	-0.7676	0.5965	-0.8262	-0.9477	0.6452	-0.9866	-0.6827
r18	-0.2277	-0.5865	0.0984	-0.9880	0.1945	0.8997	-0.9957	0.5894	-0.0251
r19	-0.2194	-0.5933	0.1068	-0.9867	0.2028	0.9033	-0.9949	0.5962	-0.0166
r20	-0.9587	0.8430	-0.9992	-0.0961	-0.9906	-0.4887	-0.0342	-0.8411	-0.9965
r21	-0.7340	0.9940	-0.9138	0.3540	-0.9489	-0.8242	0.4113	-0.9936	-0.8567
r22	-0.4270	-0.4034	-0.1127	-0.9984	-0.0157	0.7880	-0.9930	0.4067	-0.2344
r23	0.9685	-0.8225	0.9971	0.1329	0.9849	0.4561	0.0712	0.8205	0.9989
r24	0.6060	-0.9980	0.8301	-0.5099	0.8803	0.9094	-0.5623	0.9982	0.7550
r25	0.9258	-0.8921	0.9982	-0.0029	0.9993	0.5727	-0.0649	0.8905	0.9833
r26	-0.4534	0.9704	-0.7165	0.6560	-0.7808	-0.9693	0.7015	-0.9713	-0.6250
r27	0.9527	-0.3945	0.8038	0.6393	0.7423	-0.0866	0.5904	0.3913	0.8711
r28	0.2445	-0.8928	0.5441	-0.8070	0.6229	0.9997	-0.8420	0.8944	0.4364
r29	0.5996	0.2119	0.3095	0.9669	0.2158	-0.6486	0.9492	-0.2153	0.4244
r30	0.9993	1.0000	0.8233	0.5860	-0.8973				

r30	-0.2310	-0.5838	0.0951	-0.9885	0.1912	0.8982	-0.9960	0.5867	-0.0285
	-0.9319	-0.9170	-0.9813	-0.2145	0.9989				
r31	-0.1471	-0.6509	0.1796	-0.9720	0.2743	0.9324	-0.9847	0.6536	0.0569
	-0.8975	-0.8797	-0.9941	-0.1304	0.9993				
r32	0.3287	0.4982	0.0067	0.9988	-0.0904	-0.8488	0.9999	-0.5012	0.1300
	0.9639	0.9528	0.9566	0.3127	-0.9889				
r33	0.6640	-0.9999	0.8696	-0.4438	0.9134	0.8756	-0.4985	0.9999	0.8021
	-0.2380	-0.2000	-0.7210	0.6765	0.6122				
r34	0.8037	-0.9761	0.9526	-0.2498	0.9777	0.7574	-0.3094	0.9753	0.9079
	-0.0329	0.0060	-0.5629	0.8137	0.4363				
r35	0.9996	-0.6751	0.9549	0.3505	0.9215	0.2462	0.2917	0.6724	0.9842
	0.5461	0.5783	0.0127	1.0000	-0.1585				
r36	0.0931	-0.8132	0.4091	-0.8879	0.4957	0.9917	-0.9147	0.8153	0.2934
	-0.7664	-0.7408	-0.9912	0.1099	0.9613				
r37	0.7550	-0.9900	0.9261	-0.3244	0.9583	0.8059	-0.3824	0.9895	0.8725
	-0.1105	-0.0718	-0.6255	0.7660	0.5050				

	c15	c16	c17	c18	c19	c20	c21	c22	c23
c24	c25	c26	c27	c28					
r15	1.0000								
r16	0.9985	1.0000							
r17	0.9999	0.9993	1.0000						
r18	-0.7015	-0.7394	-0.7134	1.0000					
r19	-0.7075	-0.7451	-0.7192	1.0000	1.0000				
r20	0.7527	0.7156	0.7415	-0.0588	-0.0672	1.0000			
r21	0.9662	0.9507	0.9618	-0.4942	-0.5015	0.8969	1.0000		
r22	-0.5363	-0.5816	-0.5503	0.9777	0.9759	0.1521	-0.3007	1.0000	
r23	-0.7278	-0.6892	-0.7162	0.0218	0.0302	-0.9993	-0.8799	-0.1886	1.0000
r24	-0.9962	-0.9899	-0.9946	0.6366	0.6431	-0.8073	-0.9850	0.4605	0.7849
	1.0000								
r25	-0.8141	-0.7812	-0.8043	0.1573	0.1657	-0.9951	-0.9363	-0.0535	0.9907
	0.8617	1.0000							
r26	0.9957	0.9993	0.9971	-0.7647	-0.7701	0.6883	0.9381	-0.6124	-0.6609
	-0.9838	-0.7567	1.0000						
r27	-0.2520	-0.1988	-0.2358	-0.5128	-0.5056	-0.8268	-0.4929	-0.6816	0.8471
	0.3355	0.7671	-0.1611	1.0000					
r28	-0.9503	-0.9659	-0.9554	0.8885	0.8924	-0.5103	-0.8380	0.7724	0.4781
	0.9195	0.5929	-0.9751	-0.0617	1.0000				
r29	0.3563	0.4068	0.3718	-0.9158	-0.9124	-0.3471	0.1035	-0.9797	0.3816
	-0.2733	0.2525	0.4415	0.8144	-0.6294				
r30	-0.6991	-0.7371	-0.7110	1.0000	0.9999	-0.0554	-0.4913	0.9784	0.0184
	0.6340	0.1540	-0.7625	-0.5157	0.8870				
r31	-0.7576	-0.7921	-0.7684	0.9966	0.9973	-0.1404	-0.5638	0.9572	0.1037
	0.6977	0.2377	-0.8149	-0.4407	0.9231				
r32	0.6228	0.6645	0.6358	-0.9945	-0.9935	-0.0464	0.4001	-0.9944	0.0834
	-0.5521	-0.0527	0.6927	0.6002	-0.8354				
r33	-0.9868	-0.9765	-0.9840	0.5769	0.5838	-0.8493	-0.9952	0.3926	0.8292
	0.9972	0.8974	-0.9675	0.4054	0.8874				
r34	-0.9323	-0.9112	-0.9262	0.3964	0.4041	-0.9398	-0.9940	0.1948	0.9265
	0.9603	0.9690	-0.8947	0.5849	0.7735				
r35	-0.5566	-0.5104	-0.5426	-0.2016	-0.1933	-0.9659	-0.7518	-0.4028	0.9748
	0.6270	0.9355	-0.4770	0.9443	0.2703				
r36	-0.8914	-0.9148	-0.8989	0.9483	0.9510	-0.3725	-0.7445	0.8606	0.3379
	0.8484	0.4626	-0.9296	-0.2139	0.9882				
r37	-0.9576	-0.9405	-0.9527	0.4666	0.4741	-0.9104	-0.9995	0.2705	0.8944
	0.9791	0.9469	-0.9268	0.5200	0.8204				

	c29	c30	c31	c32	c33	c34	c35	c36	c37
r29	1.0000								
r30	-0.9172	1.0000							
r31	-0.8798	0.9964	1.0000						
r32	0.9529	-0.9948	-0.9825	1.0000					
r33	-0.2003	0.5741	0.6419	-0.4879	1.0000				
r34	0.0057	0.3933	0.4703	-0.2977	0.9786	1.0000			
r35	0.5780	-0.2049	-0.1207	0.3034	0.6837	0.8193	1.0000		
r36	-0.7410	0.9472	0.9711	-0.9097	0.8063	0.6672	0.1196	1.0000	
r37	-0.0721	0.4636	0.5375	-0.3711	0.9916	0.9970	0.7722	0.7231	1.0000

Friedman's test of cross sectional independence = 4.919, Pr = 1.0000

Average absolute value of the off-diagonal elements = 0.648
Source: Author's computation using sourced data

Appendix 18

Cross Sectional Dependence Test For Inequality

PESARAN TEST

. xtcsd, pesaran show

Correlation matrix of residuals:

	c1	c2	c3	c4	c5	c6	c7	c8	c9
c10	c11	c12	c13	c14					
r1	1.0000								
r2	0.6873	1.0000							
r3	0.2236	-0.7522	1.0000						
r4	0.9760	0.5088	-0.1079	1.0000					
r5	0.8720	0.3649	-0.1909	0.9332	1.0000				
r6	-0.3212	0.6668	-0.9924	0.0113	0.1276	1.0000			
r7	0.9634	0.8550	-0.4253	0.8739	0.7226	0.3147	1.0000		
r8	0.8537	-0.8243	0.7731	0.0663	0.2049	-0.7346	-0.4215	1.0000	
r9	-0.7012	0.2196	-0.0553	-0.5425	-0.7853	0.0443	-0.1413	-0.6385	1.0000
r10	-0.2625	-0.4133	0.7121	-0.4661	-0.6980	-0.7136	-0.4227	0.1326	0.6616
r11	-0.4302	-0.9395	0.8753	-0.5429	-0.5205	-0.8118	-0.8097	0.7162	0.0554
r12	0.9782	0.8936	-0.4425	0.8132	0.6313	0.3297	0.9923	-0.5094	-0.0176
r13	0.8361	-0.5320	0.8351	0.4040	0.3787	-0.8587	-0.0247	0.8657	-0.5164
r14	-0.9113	-0.7061	0.3795	-0.9596	-0.9046	-0.2841	-0.9474	0.1828	0.4503
r15	0.9725	0.7119	-0.2779	0.9647	0.8475	0.1701	0.9711	-0.1947	-0.3393
r16	-0.5734	0.1320	0.1016	-0.5160	-0.7831	-0.1173	-0.1634	-0.5250	0.9865
r17	-0.1948	0.2182	-0.7578	0.0176	0.3112	0.8079	0.0387	-0.1956	-0.4629
r18	0.9832	-0.8404	0.6777	0.0060	0.1979	-0.6243	-0.4808	0.9863	-0.6897
r19	-0.8012	0.4894	-0.8486	-0.4154	-0.3552	0.8805	-0.0138	-0.8198	0.4456
r20	-0.2480	0.6332	-0.9838	0.0590	0.2045	0.9941	0.3176	-0.6611	-0.0636
r21	-0.7044	0.3697	-0.8551	-0.4111	-0.2627	0.9059	-0.0975	-0.6686	0.2337
r22	0.9128	0.2806	-0.0736	0.9353	0.9930	0.0101	0.6833	0.3009	-0.8041
r23	0.8269	0.9362	-0.6459	0.7695	0.6666	0.5506	0.9656	-0.5755	-0.1067
r24	0.9984	0.2239	0.2511	0.9352	0.8431	-0.3419	0.6968	0.3444	-0.5539
r25	0.9999	0.5733	-0.0501	0.9700	0.8178	-0.0620	0.9133	-0.0386	-0.3353
r26	0.6021	0.9725	-0.8035	0.6042	0.5308	0.7251	0.8776	-0.7207	-0.0025
r27	0.9907	0.6017	-0.0110	0.9129	0.7053	-0.1080	0.9096	-0.1159	-0.1736
	-0.1347	-0.4928	0.8942	0.3527	-0.8700				

r28	0.6898	-0.0815	-0.0593	0.6201	0.8507	0.0594	0.2615	0.5305	-0.9902
	-0.7410	-0.1935	0.1407	0.4421	-0.5566				
r29	-0.0573	0.1339	0.3680	-0.1546	-0.4972	-0.4247	0.0739	-0.3013	0.8112
	0.8450	0.2134	0.1724	0.0325	0.2038				
r30	-0.2683	-0.4141	0.7097	-0.4712	-0.7023	-0.7106	-0.4264	0.1303	0.6642
	1.0000	0.6987	-0.3520	0.2583	0.6092				
r31	0.8849	0.5853	0.0874	0.7277	0.4326	-0.2091	0.8160	-0.2306	0.1397
	0.1595	-0.3740	0.8381	0.2848	-0.6828				
r32	0.9541	0.2099	0.3764	0.8564	0.6833	-0.4766	0.6658	0.2974	-0.3436
	0.0373	-0.1141	0.6248	0.7133	-0.7005				
r33	0.9971	0.5540	0.0086	0.9471	0.7690	-0.1235	0.8972	-0.0352	-0.2760
	-0.1918	-0.4751	0.8688	0.4102	-0.8918				
r34	0.8682	0.3654	-0.1963	0.9309	1.0000	0.1336	0.7209	0.2031	-0.7872
	-0.7034	-0.5231	0.6293	0.3739	-0.9037				
r35	-0.7877	-0.5209	0.3995	-0.9030	-0.9759	-0.3363	-0.7827	-0.0086	0.7080
	0.8002	0.6868	-0.7029	-0.1678	0.9368				
r36	0.7365	0.0957	-0.1513	0.7426	0.9310	0.1307	0.4370	0.4033	-0.9488
	-0.7818	-0.3458	0.3232	0.3937	-0.7017				
r37	0.0837	0.4643	0.0707	0.0389	-0.3171	-0.1509	0.3617	-0.5522	0.7995
	0.6126	-0.1330	0.4629	-0.1525	-0.0625				

	c15	c16	c17	c18	c19	c20	c21	c22	c23
c24	c25	c26	c27	c28					
r15	1.0000								
r16	-0.3372	1.0000							
r17	0.0220	-0.5996	1.0000						
r18	-0.2576	-0.5969	-0.0441	1.0000					
r19	-0.2158	0.2935	0.5843	-0.7188	1.0000				
r20	0.1947	-0.2239	0.8609	-0.5439	0.8345	1.0000			
r21	-0.2604	0.0749	0.7531	-0.5382	0.9680	0.8845	1.0000		
r22	0.8279	-0.7831	0.2247	0.2823	-0.4630	0.0893	-0.3700	1.0000	
r23	0.8995	-0.1704	0.2522	-0.5978	0.2309	0.5509	0.1630	0.5999	1.0000
r24	0.8388	-0.4724	-0.2480	0.2525	-0.7076	-0.2916	-0.7039	0.8870	0.5170
	1.0000								
r25	0.9728	-0.2953	-0.1785	-0.1299	-0.4188	-0.0378	-0.4749	0.8251	0.7853
	0.9248	1.0000							
r26	0.7697	-0.0991	0.3878	-0.7142	0.4571	0.7158	0.3913	0.4429	0.9708
	0.3001	0.6138	1.0000						
r27	0.9438	-0.1261	-0.3096	-0.2258	-0.4020	-0.1016	-0.4994	0.7157	0.7704
	0.8820	0.9848	0.6014	1.0000					
r28	0.4422	-0.9906	0.5145	0.5825	-0.3751	0.1649	-0.1743	0.8569	0.2409
	0.5883	0.4159	0.1424	0.2540	1.0000				
r29	-0.0291	0.8853	-0.8705	-0.4342	-0.1232	-0.5163	-0.3592	-0.4604	-0.0464
	-0.0262	0.0880	-0.0895	0.2577	-0.8170				
r30	-0.4557	0.7716	-0.8901	0.0239	-0.3177	-0.7801	-0.4708	-0.6278	-0.5658
	-0.2103	-0.2827	-0.6088	-0.1398	-0.7437				
r31	0.8040	0.2012	-0.5460	-0.3681	-0.3584	-0.2363	-0.5244	0.4506	0.6621
	0.7348	0.8727	0.5079	0.9442	-0.0694				
r32	0.7851	-0.2402	-0.4800	0.1733	-0.7498	-0.4495	-0.8022	0.7398	0.4541
	0.9663	0.9064	0.2280	0.9071	0.3697				
r33	0.9535	-0.2260	-0.2635	-0.1383	-0.4510	-0.1058	-0.5237	0.7827	0.7546
	0.9230	0.9961	0.5765	0.9944	0.3519				
r34	0.8454	-0.7861	0.3185	0.1974	-0.3498	0.2107	-0.2561	0.9923	0.6667
	0.8390	0.8142	0.5323	0.7009	0.8529				
r35	-0.8643	0.7398	-0.4442	-0.0202	0.1449	-0.4046	0.0624	-0.9434	-0.7770
	-0.7391	-0.7872	-0.6835	-0.6765	-0.7959				
r36	0.5976	-0.9560	0.4999	0.4424	-0.3381	0.2295	-0.1662	0.9275	0.4151
	0.6740	0.5586	0.3096	0.4062	0.9823				
r37	0.2207	0.8357	-0.7035	-0.6768	0.0568	-0.2442	-0.1953	-0.3131	0.2818
	0.0558	0.2779	0.2553	0.4393	-0.7570				

	c29	c30	c31	c32	c33	c34	c35	c36	c37
r29	1.0000								
r30	0.8441	1.0000							
r31	0.5602	0.1549	1.0000						
r32	0.2282	0.0314	0.8418	1.0000					
r33	0.1707	-0.1972	0.9081	0.9269	1.0000				
r34	-0.5031	-0.7076	0.4270	0.6777	0.7648	1.0000			
r35	0.5273	0.8037	-0.4043	-0.5661	-0.7298	-0.9769	1.0000		

r36	-0.7545	-0.7849	0.0855	0.4622	0.4949	0.9328	-0.8946	1.0000	
r37	0.9399	0.6115	0.7037	0.2783	0.3452	-0.3221	0.2905	-0.6400	1.0000

Pesaran's test of cross sectional independence = 4.011, Pr = 0.0001

Source: Author's computation using sourced data

FRIEDMA'S TEST.

xtcsd, friedman show abs

Correlation matrix of residuals:

	c1	c2	c3	c4	c5	c6	c7	c8	c9
c10	c11	c12	c13	c14					
r1	1.0000								
r2	0.6873	1.0000							
r3	0.2236	-0.5543	1.0000						
r4	0.9760	0.8290	0.0059	1.0000					
r5	0.8720	0.9549	-0.2822	0.9577	1.0000				
r6	-0.3212	0.4671	-0.9949	-0.1072	0.1835	1.0000			
r7	0.9634	0.8568	-0.0457	0.9987	0.9713	-0.0557	1.0000		
r8	0.8537	0.2085	0.6984	0.7198	0.4895	-0.7674	0.6830	1.0000	
r9	-0.7012	-0.9998	0.5381	-0.8397	-0.9605	-0.4499	-0.8666	-0.2274	1.0000
r10	-0.2625	-0.8813	0.8818	-0.4664	-0.7013	-0.8295	-0.5115	0.2783	0.8720
r11	-0.4302	-0.9514	0.7837	-0.6165	-0.8170	-0.7167	-0.6563	0.1028	0.9452
r12	0.9782	0.8232	0.0163	0.9999	0.9546	-0.1175	0.9981	0.7270	-0.8340
r13	0.8361	0.1762	0.7216	0.6966	0.4605	-0.7881	0.6586	0.9995	-0.1953
r14	-0.9113	-0.9254	0.1977	-0.9791	-0.9962	-0.0973	-0.9883	-0.5635	0.9326
r15	0.9725	0.8376	-0.0097	0.9999	0.9620	-0.0917	0.9993	0.7089	-0.8481
r16	-0.5734	-0.9892	0.6704	-0.7381	-0.9010	-0.5917	-0.7719	-0.0629	0.9862
r17	-0.1948	0.5786	-0.9996	0.0235	0.3103	0.9914	0.0751	-0.6771	-0.5627
r18	0.9832	0.5430	0.3979	0.9198	0.7679	-0.4888	0.8983	0.9345	-0.5592
r19	-0.8012	-0.1160	-0.7624	-0.6516	-0.4057	0.8240	-0.6116	-0.9956	0.1353
r20	-0.2480	0.5333	-0.9997	-0.0310	0.2580	0.9971	0.0207	-0.7162	-0.5167
r21	-0.7044	0.0314	-0.8493	-0.5329	-0.2668	0.8984	-0.4885	-0.9710	-0.0120
r22	0.9128	0.9240	-0.1939	0.9799	0.9959	0.0934	0.9889	0.5667	-0.9312
r23	0.8269	0.9768	-0.3633	0.9295	0.9963	0.2670	0.9473	0.4130	-0.9808
r24	0.9984	0.6449	0.2786	0.9620	0.8428	-0.3745	0.9467	0.8819	-0.6596
r25	0.9999	0.6995	0.2071	0.9795	0.8801	-0.3051	0.9678	0.8448	-0.7132
r26	0.6021	0.9938	-0.6436	0.7615	0.9159	0.5627	0.7940	0.0982	-0.9914
r27	0.9907	0.5819	0.3543	0.9372	0.7972	-0.4472	0.9180	0.9167	-0.5976
r28	0.6898	1.0000	-0.5515	0.8309	0.9559	0.4641	0.8585	0.2119	-0.9999
r29	-0.0573	-0.7646	0.9603	-0.2734	-0.5387	-0.9270	-0.3227	0.4710	0.7519
r30	-0.2683	-0.8841	0.8790	-0.4717	-0.7055	-0.8261	-0.5166	0.2726	0.8749
r31	0.9784	0.9259	-0.2634	0.4997	0.4634				
r32	1.0000	0.9851	-0.4625	0.3041	0.6412				

r31	0.8849	0.2698	0.6519	0.7622	0.5436	-0.7254	0.7277	0.9980	-0.2884
0.2172	0.0399	0.7689	0.9954	-0.6145					
r32	0.9541	0.4382	0.5052	0.8660	0.6854	-0.5901	0.8390	0.9705	-0.4556
0.0385	-0.1401	0.8711	0.9620	-0.7461					
r33	0.9971	0.6301	0.2969	0.9566	0.8323	-0.3922	0.9403	0.8908	-0.6451
-0.1885	-0.3604	0.9596	0.8754	-0.8774					
r34	0.8682	0.9571	-0.2895	0.9554	1.0000	0.1910	0.9694	0.4828	-0.9626
-0.7067	-0.8214	0.9523	0.4538	-0.9955					
r35	-0.7877	-0.9889	0.4244	-0.9030	-0.9884	-0.3304	-0.9239	-0.3516	0.9916
0.8013	0.8950	-0.8984	-0.3206	0.9715					
r36	0.7365	0.9975	-0.4946	0.8662	0.9734	0.4040	0.8908	0.2766	-0.9987
-0.8460	-0.9275	0.8609	0.2448	-0.9497					
r37	0.0837	-0.6663	0.9900	-0.1353	-0.4148	-0.9706	-0.1863	0.5904	0.6517
0.9396	0.8636	-0.1251	0.6166	0.3341					

	c15	c16	c17	c18	c19	c20	c21	c22	c23
c24	c25	c26	c27	c28					
r15	1.0000								
r16	-0.7485	1.0000							
r17	0.0391	-0.6919	1.0000						
r18	0.9136	-0.4141	-0.3707	1.0000					
r19	-0.6397	-0.0308	0.7430	-0.8970	1.0000				
r20	-0.0154	-0.6515	0.9985	-0.4208	0.7784	1.0000			
r21	-0.5197	-0.1776	0.8334	-0.8222	0.9891	0.8623	1.0000		
r22	0.9829	-0.8579	0.2227	0.8229	-0.4871	0.1692	-0.3532	1.0000	
r23	0.9351	-0.9349	0.3906	0.7102	-0.3260	0.3398	-0.1833	0.9844	1.0000
r24	0.9577	-0.5259	-0.2502	0.9920	-0.8339	-0.3026	-0.7436	0.8882	0.7936
1.0000									
r25	0.9763	-0.5872	-0.1782	0.9799	-0.7910	-0.2316	-0.6923	0.9196	0.8363
0.9973	1.0000								
r26	0.7715	-0.9994	0.6659	0.4461	-0.0046	0.6242	0.1426	0.8756	0.9469
0.5558	0.6155	1.0000							
r27	0.9317	-0.4564	-0.3266	0.9989	-0.8753	-0.3776	-0.7946	0.8487	0.7426
0.9968	0.9882	0.4877	1.0000						
r28	0.8395	-0.9887	0.5758	0.5459	-0.1194	0.5304	0.0280	0.9253	0.9775
0.6475	0.7019	0.9934	0.5847	1.0000					
r29	-0.2883	0.8508	-0.9681	0.1261	-0.5515	-0.9530	-0.6682	-0.4599	-0.6089
-0.0005	-0.0742	-0.8316	0.0792	-0.7624					
r30	-0.4853	0.9431	-0.8926	-0.0878	-0.3615	-0.8667	-0.4948	-0.6382	-0.7636
-0.2131	-0.2845	-0.9307	-0.1346	-0.8825					
r31	0.7520	-0.1257	-0.6293	0.9551	-0.9877	-0.6707	-0.9540	0.6176	0.4697
0.9099	0.8769	0.1609	0.9401	0.2731					
r32	0.8581	-0.3017	-0.4796	0.9928	-0.9436	-0.5267	-0.8847	0.7487	0.6205
0.9696	0.9489	0.3353	0.9860	0.4413					
r33	0.9520	-0.5095	-0.2687	0.9942	-0.8443	-0.3208	-0.7563	0.8792	0.7818
0.9998	0.9957	0.5397	0.9982	0.6328					
r34	0.9599	-0.9043	0.3176	0.7630	-0.3987	0.2654	-0.2594	0.9951	0.9970
0.8386	0.8765	0.9189	0.7925	0.9581					
r35	-0.9095	0.9564	-0.4509	-0.6619	0.2624	-0.4015	0.1176	-0.9706	-0.9978
-0.7514	-0.7980	-0.9662	-0.6964	-0.9894					
r36	0.8739	-0.9765	0.5200	0.6006	-0.1854	0.4726	-0.0388	0.9485	0.9894
0.6969	0.7479	0.9835	0.6375	0.9978					
r37	-0.1508	0.7684	-0.9937	0.2644	-0.6634	-0.9861	-0.7662	-0.3304	-0.4912
0.1402	0.0669	-0.7452	0.2187	-0.6637					

	c29	c30	c31	c32	c33	c34	c35	c36	c37
r29	1.0000								
r30	0.9771	1.0000							
r31	0.4143	0.2113	1.0000						
r32	0.2443	0.0325	0.9838	1.0000					
r33	0.0187	-0.1944	0.9177	0.9741	1.0000				
r34	-0.5451	-0.7109	0.5372	0.6798	0.8280	1.0000			
r35	0.6602	0.8048	-0.4100	-0.5670	-0.7386	-0.9896	1.0000		
r36	-0.7175	-0.8492	0.3367	0.5002	0.6830	0.9751	-0.9969	1.0000	
r37	0.9901	0.9375	0.5383	0.3783	0.1591	-0.4217	0.5480	-0.6124	1.0000

Friedman's test of cross sectional independence = 10.432, Pr = 1.0000

Average absolute value of the off-diagonal elements = 0.654

Source: Author's computation using sourced data

Appendix 19

HETEROSCEDASTICITY TEST FOR GROWTH

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: $\sigma(i)^2 = \sigma^2$ for all i

chi2 (37) = 3276.07
Prob>chi2 = 0.0000

Source: Author's computation using sourced data

Appendix 20

HETEROSCEDASTICITY TEST FOR POVERTY

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: $\sigma(i)^2 = \sigma^2$ for all i

chi2 (37) = 1242.57
Prob>chi2 = 0.0000

Source: Author's computation using sourced data

Appendix 21

HETEROSCEDASTICITY TEST FOR INEQUALITY

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: $\sigma(i)^2 = \sigma^2$ for all i

chi2 (37) = 3840.81
Prob>chi2 = 0.0000

Source: Author's computation using sourced data