2016

An Investigation of the Nexus between Poverty and the Informal Sector in Developing Economies: A Case Study of Nigeria

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AN INVESTIGATION OF THE NEXUS BETWEEN POVERTY AND THE INFORMAL

SECTOR IN DEVELOPING ECONOMIES: A CASE STUDY OF NIGERIA

(TITLE)

BY

OMOTARA ADEEKO

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Arts in Economics

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2016

YEAR

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Acknowledgement

I would like to take this opportunity to thank all of the people that supported me through my graduate studies and my thesis. I am particularly grateful to Dr. A. Désiré Adom, my supervisor, for his immense guidance, patience and help in completing this thesis. Without your effort and understanding, I could not have been able to choose my thesis topic, also, being able to complete my thesis and degree on time. I am privileged to be under his tutelage.

I would also like to thank Dr. Mukti Upadhyay, Dr. Ali Moshtagh and Dr. Ahmed Abou-Zaid for their help and suggestion in this thesis. Their encouragement and suggestions in completing this thesis deserves my earnest appreciation. I also thank all my professors and friends (Erica Tiku, Freda Opoku, Dayo Kukoyi, Annie Barber, Peter Ebukuyo, Ebede Beluchukwu, Ifeanyi Okonta and Salim Nuhu) at Eastern Illinois University for their support.

I owe my deepest gratitude to my parents, siblings and my Ohio family. Thank you for supporting my education, financially, emotionally and spiritually. Mom and Dad, you are my inspirations, helping me to struggle against all odds and keeping me thriving.

AN INVESTIGATION OF THE NEXUS BETWEEN POVERTY AND THE INFORMAL SECTOR IN DEVELOPING ECONOMIES: A CASE STUDY OF NIGERIA

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ABSTRACT

This paper examines the relationship between poverty and the informal sector in Nigeria. In order to achieve this objective both primary and secondary sources of data mostly spanning from 1980 to 2014 are utilized. The methodology follows three stages. First, the Granger causality test is performed to determine the direction of causality. Using that information, a baseline model, along with several variants, is built on the next stage. Lastly, a robustness check is completed to ensure that the results do not exhibit severe spuriousness problems.

Granger causality tests indicate that the informal sector causes poverty. Overall, nine models including some key determinants of poverty, such as unemployment, debt service, inflation, rural population and corruption, are considered. The robustness check includes two distinct steps. First, different proxies for poverty and the informal sector are used. Second, a Jarque-Bera test is conducted. The findings from the check shows that the residuals are normally distributed and not spurious. The regression result reveals that as the informal sector expands, poverty expands too. Therefore, a reduction in the size of the informal sector could be targeted by decision makers in their attempt to fight poverty in Nigeria. In practice, policies focusing on curtailing red tapes or lengthy bureaucratic processes, stamping out corruption, and training as well as providing support to small business owners could be implemented or strengthened.

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1. Introduction

The informal sector is a prevalent and persistent economic feature of most developing economies, contributing significantly to employment creation, production, and income generation. Recent estimates of the size of the informal sector in developing countries in terms of its share of employment range roughly between one-fifth and four-fifths. In terms of its contribution to GDP, the informal sector accounts for between 25% and 40% of annual output in developing countries.

The International Labor Organization (ILO) was the first to employ the term "informal sector" in its report on Kenya (1972). The ILO's mission to Africa in 1972 recognized that the traditional or informal sector had not just persisted but expanded. The mission also observed that the informal sector activities, described as activities that are unrecognized, unrecorded, unprotected, and unregulated by the public authorities, were not confined to marginal activities but also included profitable enterprises in manufacturing.

There are various reasons why governments may be concerned about large informal sectors. These include potentially negative consequences for competitiveness and growth, incomplete coverage of formal social programs, undermining social cohesion and law and order, and fiscal losses due to undeclared economic activity. For most governments, these concerns outweigh any advantages that the informal sector offers as a source of job creation and as a safety net for the poor.

Lately, many African countries have experienced substantial economic growth but this has not necessarily led to the creation of decent jobs. This is because most of the labor force comprises of the informal sector. African Development Bank in 2013, reported that 55% of sub-Saharan Africa's GDP and 80% of the labor force is informal sector driven. Nine in ten rural dwellers have informal jobs as a means of support to earn a living.

In Nigeria, the informal sector serves as a source of employment for the poor because it provides employment in one form of economic activity or another. This sector of the economy has helped in absorbing low level qualification holders and rural-urban drift, population that is unable to secure wage employment in the modern sector.

The growth of the informal sector in Nigeria like in most African countries stems from government failures and the hidden opportunities that become available when governments fail. Although the informal sector is an avenue to create a reasonable source of livelihood for the poor, it has challenges such as lack of income security and other benefits that are inclusive in the formal employment framework.

Poverty remains endemic in Nigeria, despite the introduction of several anti-poverty programs by successive governments. According to statistics, the incidence of poverty has significantly increased in Nigeria since 1980. The percentages of the Nigerian population that were classified as 'extremely poor' over the last three decades are as follows: 6.2% (1980); 12.1% (1985); 13.9% (1992); 29.3% (1996); 22.0% (2004) and 38.7% (2010). These increases are strongest among the most vulnerable groups. In 2012, for example, the National Bureau of Statistics (NBS) reported that the poverty crisis in Nigeria varied by region, sector and gender, and impacted Nigerian youth, children and mothers more than the adult male population.

Quite a number of studies have investigated the relationship between informal sector and poverty. While the papers helped to reveal the presence of the informal sector in the Nigerian economy, especially as a means of employment, no econometric model was used and the direction of causality was not shown. Also, the suggested recommendations were that the informal sector should be empowered which I believe is not a good policy recommendation because if this sector is empowered it will further lead to no tax revenue for the government and tax is important to any economy because this is a major revenue source for any economy. Therefore, this paper will add to the literature by addressing these issues.

This study is going to contribute to the literature by clearly defining the direction of causality between poverty and the informal sector. Thereby, rightly examining the relationship between poverty and the informal sector in Nigeria.

The broad objective of this work is to empirically investigate the relationship between poverty and the informal sector in Nigeria. Towards this objective, this study attempts to address three key questions:

1. What is the direction of causality between poverty and the informal sector?
2. Based upon the direction of causality established, what is the impact of poverty on the informal sector, or vice-versa?
3. In accordance with the results obtained, what are the implications and possible solutions to the problems identified?

The rest of this work is organized around six sections. Section 2 includes a comprehensive and critical review of the literature on this topic. Section 3 completes a background analysis and an economic presentation of Nigeria along with its potentials and the challenges it faces. Section 4 describes the methodology, while section 5 discusses the results, their implications and makes policy recommendations. At last, section 6 concludes this work.

2. Literature review

The literature reviews existing literatures which deal with the relationship between informal sector and poverty. This section examines the concepts, existing theories and various empirical findings covering both developing and developed economies from various geographical areas across the globe.

The informal sector is an important part of the economy because the informal sector has helped in reducing poverty by creating employment for the individuals who cannot be employed in the formal sector. Kapunda & Moffat (2014) in trying to examine employment trends in the informal sector and poverty reduction in Botswana used different surveys on the employment status in informal business households, informal employment as a percentage of the labor force, across genders. It was shown that the informal self-employment has been increasing in the last two decades and has helped in generating employment, especially to children and youths which has in turn helped to improve their welfare. Improvement in technical/vocational education is also encouraged.

Dhemba (1999) was of the opinion that by adopting the informal sector, this will help in the fight against poverty as advocated by developmentalists who are of the opinion that economic growth is achieved through state intervention and adoption of specific poverty alleviation measures as against the modernization theorist who support the weakening of traditional institutions and cultural values and rapid industrialization in achieving economic growth as in the case of Zimbabwe which has a high level of urban poverty. Dhemba (1999) believed that as long as there is mass urban poverty, there will also be the presence of the informal sector. Therefore, in order to alleviate this poverty policies relating to credit facilities and non-governmental mobilizations should be put in place, urban management and training (Dhemba 1999, Rogerson1996).

A major determinant of the reduction in GDP in Argentina was poverty which came into effect after the world wars. A major policy that was introduced to curb this was the head of households plan and because the majority of the population could not find a decent job, most of them turned to the informal sector (Millan-Smitmans 2010).

The informal sector is a major source of income, especially for the poor and helps in the reduction of poverty and the improvement of labor productivity, especially in the rural areas where agriculture is dominant, better education and health facilities is encouraged (Tambunan 2004 & Nikopur & Shah Habibullah 2010).

Yuriy (2013) focuses on Russia and examines the economic effects and social consequences of the involvement of the poor in the informal sector in Russia. The author used the income approach to calculate the labor income of the poor and the number of the poor employed in the informal sector. It was suggested that the mostly under skilled poor save very little or nothing and do not receive income from other sources. The author finds out that the informal economy has not helped in decreasing poverty level in Russia, and a way to minimize exploitation in this sector there should be laws that will protect the workers in this sector but this might lead to a stifle in the growth and development of this sector and also affect employment in this sector.

While unemployment is one of the major causes for the existence of the informal economy, other contributing factors also include job market regulations, especially in Spain, Greece and France, indirect taxes in Spain and Direct taxes in France, a high tax burden, high inflation rates with respect to Turkey. Although the informal sector has its advantages, of contributing to the eradication of poverty, the down side is that the jobs provided by this sector are of low quality and of poor working conditions so therefore does not have a lot of contribution to poverty reduction. The solution provided includes; reduction of bureaucracy, structured tax system, improvement in public education (Saglam 2007)

Poverty affects the informal sector in Nigeria because more than half of the population is involved in one form of economic activity or the other and how this sector can be empowered to reduce poverty and generate income. Iyoboyi (2013) showed in his work that the Nigerian economic landscape and the informal sector are littered with the mosaic of poverty. The informal sector is an engine of growth. The majority of Nigerians is engaged in it. The corollary of this is that there is an abysmal level of poverty in the informal sector. Reducing the level of poverty in the informal sector is imperative as a catalyst of growth and consequently on economic and social regeneration. Different determinants were reviewed in alleviating poverty in the informal sector like; inaccessibility to finance, high operational cost, and intense global competition. The recommendations made were improvement in power supply, skill improvement, more access to funds, women development, policies that directly affect the sector.

The informal sector promotes employment in Nigeria. In explaining this (Akinwale, 2012) used the social capital theory which explains the cooperation among individuals and groups in a society. Secondary and primary data were used, primary data from trainees, masters and journeymen from tailoring and carpentry workshops were collected through a structured questionnaire. The paper showed the importance of the informal sector in providing employment to individuals in poverty, unemployed and those with little or no education. Employment generation can be sustained with external stakeholders like colleagues, masters, relatives which explains the social theory. The paper goes to show that the informal sector promotes entrepreneurship, which could help to drive the economy.

According to Abubakar (2002), poverty is always associated with unemployment and together they produce in all material respects, the same unpleasant socioeconomic and political repercussions. There exist a political, economic, social, health, and psychological effects of poverty and unemployment. Poverty and unemployment destroy aspirations, hope, happiness, self-esteem and sense of personal competence. Abubakar further added that poverty, produces social, political religious, ethnic violence, the rise in anti-behavior.

Siyanbola (2005) states that the debt service obligations and poverty are positively related. A country with a huge debt burden like Nigeria, would find it difficult to utilize available resources for projects that benefit the poor. Tomori & Adebiyi (2002), demonstrated that the increases in government expenditure on debt service obligations tend to adversely affect development from the distribution perspective, as the poor are likely to receive the short end of the stick in expenditure reduction measures.

The governance model (also known as the political model) contends that corruption affects poverty in the sense that corruption reduces governance capacity (Kaufmann et al, 1999). Corruption has been attributed as one of the causes of poverty and unemployment in Nigeria. For instance, the amount of money that ought to be plugged into the productive sectors of the economy, strengthen the health sector, social and educational services are diverted into private pockets of only but a few individuals not minding that a majority of Nigerians are out of it, amongst other means like investments directed at white elephant's projects (Abubakar 2002).

3. A Background Analysis and Economic Presentation of Nigeria

The background analysis will examine different potentials and strengths as well as the challenges of Nigeria. This section will examine Nigeria's geography and people, the economy, and issues such as poverty and the informal sector.

3.1 Geography and the people

Nigeria is situated in West Africa, surrounded by Cameroon to the east, Benin to the west, Niger to the north and the Gulf of Guinea to the south. It is inhabited by an estimated 167 million people and a land area of around 924 thousand square kilometers.

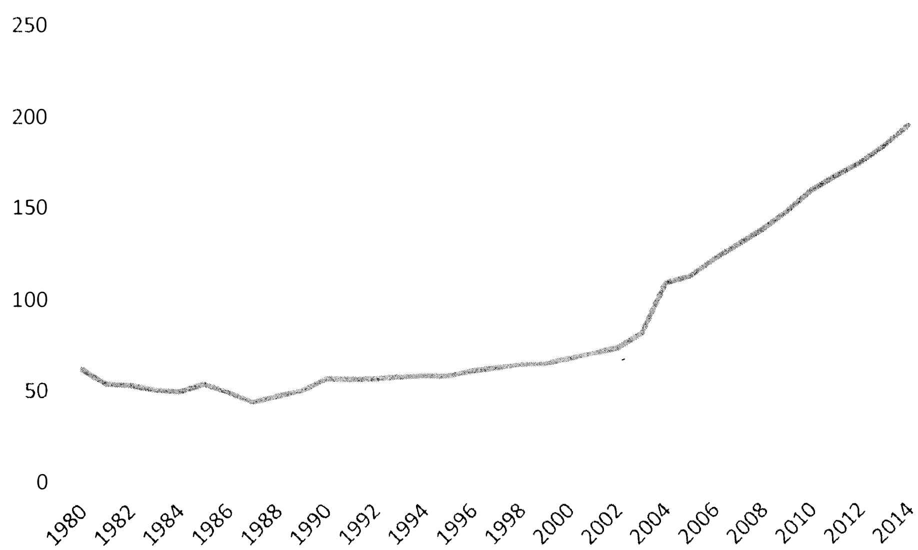
Nigeria's population is as diverse as it is large, with some 250 ethnic groups. Nigeria's three largest ethnic groups are: Hausa-Fulani (29 percent of the population), Yoruba (21 percent) and Igbo, or Ibo (18 percent). Northern Nigeria is mostly Islamic and dominated by the Hausa-Fulani ethnic group. Southern Nigeria is more westernized and urbanized than the north, with the Yoruba in the southwest and the Igbo in the southeast. It is estimated that about half the Yorubas are Christian and half Muslim, though many maintain traditional beliefs. The Igbo in the southwest tend to be Christian; many are Roman Catholic.

3.2 The economy

Nigeria is a natural resource rich country. It is considered the second largest economy in West Africa with total area of 923,768 km^2, and the largest oil producer in Africa (OPEC 2015). Following an April 2014 statistical rebasing exercise involving among other the inclusion of the entertainment sector in GDP computation, Nigeria has emerged as Africa's largest economy by population and the 22nd largest economy in the world.

The GDP computation is divided into two broad categories which are oil and non-oil sectors, oil sector being a major contributor to GDP. The non-oil sector consists of agriculture, trade, manufacturing, telecommunications, entertainment, banking and finance, real estate and services. Figure 1 shows a sharp increase in GDP in 2010 which is attributed to the financial sector recapitalization after the 2008-9 financial crisis and the continuous increase is driven by growth in agriculture and telecommunications. For the purpose of this study, economic variables such as unemployment, inflation, debt servicing and corruption will be discussed.

Figure 1: GDP in Nigeria from 1980-2014 ('billions)



Source: World Development Indicator, 2014

3.2.1 Unemployment

One of the challenges facing the Nigerian economy is unemployment, which has maintained a rising trend over the years. Figure 2 shows that the lowest rate of unemployment recorded was in 1995 at 1.9% and increased to 20% in 2009 due to an increased level of graduates without matching job opportunities and slow disbursement of the capital budget by the Federal government.

According to the Nigerian Bureau of Statistics (NBS), the country's unemployment rate has increased to 9.9 percent in the third quarter of 2015, representing a fourth consecutive rise in the unemployment rate since the third quarter of 2014. The Bureau revealed that a total of 1,454,620 Nigerians is unemployed in this quarter compared to 529,923 in the second quarter and this has led to an increase from 8.2 percent in second quarter 2015 to 9.9 percent in third quarter 2015.

Figure 2: Unemployment Trend in Nigeria from 1980-2014

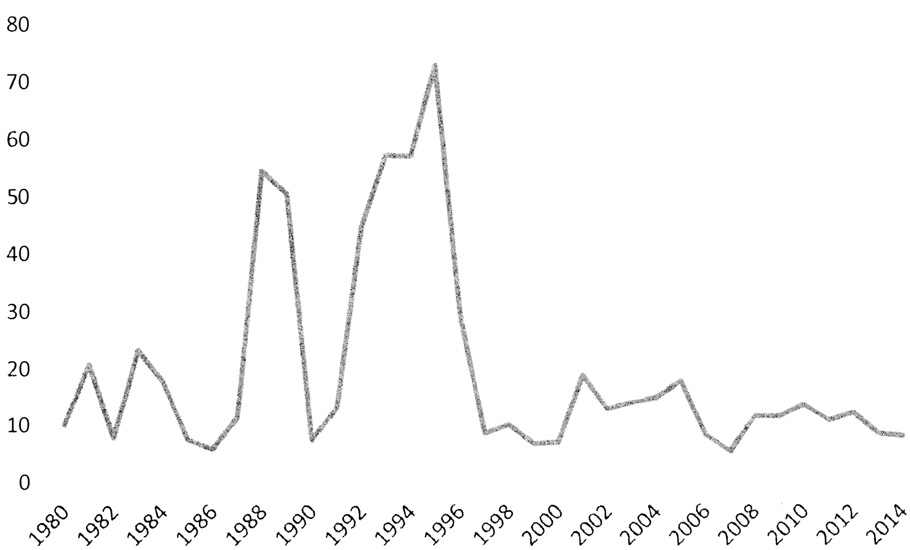
Source: World Development Indicator, 2014

3.2.2 Inflation

The inflation rate in Nigeria has experienced both increase and decrease in its rates. For example, in the 1970's there was an oil boom which helped reduce inflation, then it increased again in 1999 as seen in Figure 3 despite the apparent benefits of the return to democracy. Between 1999-2007, the debt reduction policies helped to reduce the hike in inflation.

The National Bureau of Statistics stated that the reduction in oil prices in the international market has reduced the government revenue and this contributes to the recent increase in the rate of inflation.

Figure 3: Inflation rate in Nigeria from 1980-2014



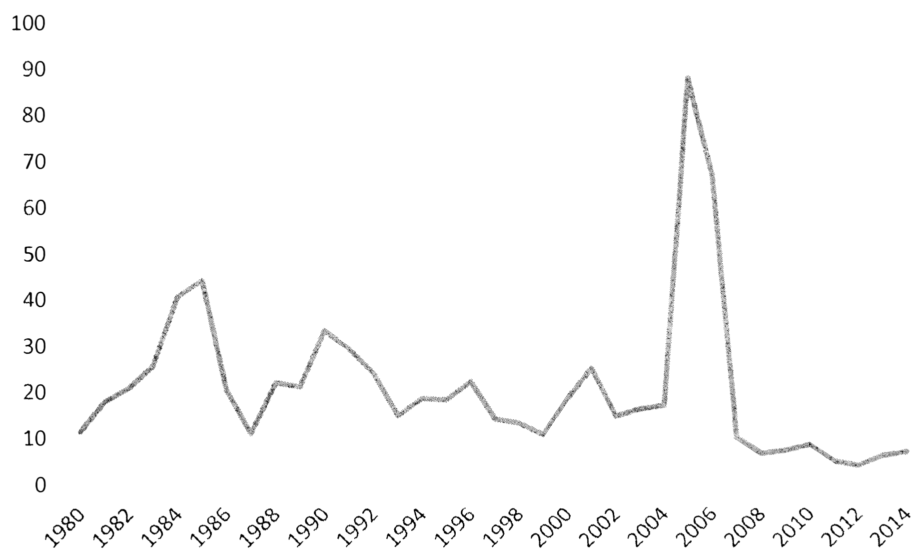
Source: World Development Indicator, 2014

3.2.3 Debt burden

Nigeria's debt dates back to pre-independence, however the amount of debt was small, until 1978. The fall in oil prices forced the country to raise its first large amount of loan of more than a billion dollars from the international capital market. Nigeria continued borrowing without paying back and this led to accumulated interest. The total outstanding debt with interest stood at 30.99 billion dollars as of 2002. The sharp decline seen in Figure 4 is due to the debt relief awarded to Nigeria in 2004 by the Paris club.

The International Monetary Fund (IMF) has raised concerns over Nigeria's rising debt portfolio, warning that the cost of servicing the country's debt could rise again to 35 per cent of revenues in the next four years (Idowu 2015). Therefore, the country needs to be prudent in borrowing.

Figure 4: Debt service in Nigeria from 1980-2014 ('billions)



Source: World Development Indicator, 2014

3.2.4 Corruption

A resource-rich economy, like Nigeria's, where easy access to oil revenues encourages corruption. Of 168 countries surveyed by Transparency International, an anti-corruption group Germany, in its annual Corruption Perception Index, Nigeria ranks 32nd from the bottom.

Corruption affects all sectors of the economy. Corruption led to the high debt servicing because the funds borrowed from the international market is mismanaged by the government officials, leads to a higher interest rate in the economy and also reduces the purchasing power in the economy. For continued economic growth the levels of corruption should be brought to a minimum.

Table 1: Corruption Perception Index (CPI) of Nigeria from 1996-2014

YEAR	RANK	SCORE
1996	54	0.69
1997	52	1.76
1998	81	1.9
1999	98	1.6
2000	90	1.2
2001	90	1
2002	101	1.6
2003	132	1.4
2004	144	1.6
2005	152	1.9
2006	142	2.2
2007	147	2.2
2008	121	2
2009	130	2.5
2010	134	2.4
2011	143	2.4
2012	139	0.3
2013	144	0.4
2014	136	0.3

Source: Human Perception Index.

The CPI Score relates to perceptions of the degree of which corruption is seen by business people--a perfect 10.00 would be a totally corruption-free country

3.3 Poverty

The Central Bank of Nigeria (1999:1) views poverty in a comprehensive manner as put as: a state where an individual is not able to cater adequately for his or her basic needs of food, clothing and shelter, is unable to meet social and economic obligations; lacks gainful employment, skills, assets and self-esteem; and has limited access to social and economic infrastructure such as education, health, potable water and sanitation and consequently has limited chances of advancing his or her welfare to the limit of his or her capabilities.

3.3.1 Causes of Poverty

The causes of poverty given in most writings are more or less general ones because poverty is produced by several factors that may vary from society to society. Therefore, the CBN (1999:2) grouped causes of poverty into two categories, namely "Low economic growth and market imperfections". Low economic growth here refers to increase in unemployment and general underdevelopment with low income that is not enough or sufficient to sustain the poor.

On the other hand, market imperfection includes those factors which through institutional distortion do not allow the poor to have access to opportunities or access to productive assets which will improve their capacity to adapt to change and survive.

Therefore, this inability to adapt breeds poverty and this denied the victims the most basic needs for survival.

3.3.2 Review of Poverty Reduction Programs in Nigeria

Aware of the grave consequence of poverty in the country, successive Nigerian governments have designed and implemented numerous policies since the 1980's to tackle this scourge. Some of these programs include, among others, the Green Revolution (GR), Directorate of Food, Road and Rural Infrastructure (DFRRI), National Directorate of Employment (NDE), Better Life Program (BLF), Peoples Bank of Nigeria (PBN), Community Bank (CB), Family Support Program (FSP), Family Economic Advancement Program (FEAP), Poverty Alleviation Program (PAP), and National Poverty Eradication Program (NAPEP). A select few are briefly reviewed below because they were effective:

a. The Green Revolution

The Green Revolution was formally launched in Nigeria in 1980 by the then Federal Government. The major objective of the program was to modernize the agricultural sector of the economy, especially in achieving self-sufficiency in food production Oyeranti (2005). The implementation strategy of the program sought to achieve its objectives through total mobilization of plant, animal resources within a food policy for Nigeria.

b. Directorate of Food, Road and Rural Infrastructure

The Directorate of Food, Roads and Rural Infrastructure was a rural development strategy by the then president Babangida to complement the efforts of the past, Green Revolution, especially in the rural areas where the majority of Nigerians lives. The DFRRI was established with the aim of rehabilitating various categories of roads in the country and especially for the development of rural feeder roads in order to strengthen the massive efforts of food and agricultural self-sufficiency in the shortest possible period.

c. National Directorate of Employment

The Federal Government approved the establishment of the National Directorate of Employment (NDE) on 26th March, 1986 but its programs were launched nationwide in January 1987. The major objectives of the program are: to design an employment program to combat mass unemployment, to articulate policies that would help develop work programs aimed at promoting skill acquisition, self-employment and labor intensive potentials and also collect and maintain a data bank on unemployment and vacancies in the country.

d. Better Life Program (BLP) -Family Economic Advancement Program

The Better Life Program came into being in September 1986, to stimulate women in rural areas towards achieving a better and a higher standard of living. It helped to raise the social consciousness of women about their right and roles, as well as their social, political and economic responsibilities. The program initiator was the wife of the then Head of State of Nigeria Mrs. Maryam Babangida and was generally aimed at complementing the then existing Federal Government policy to develop the rural areas.

e. National Poverty Eradication Program

The National Poverty Eradication Program (NAPEP) was launched by President Olusegun Obasanjo in January 2001. The National Poverty Eradication Program (NAPEP) is a program designed to eradicate poverty in Nigeria through a number of strategies. The major strategy of the National Poverty Eradication Program (NAPEP) is the Youth Employment Scheme (YES). This also has other sub-strategies, which includes the Capacity Acquisition Program (CAP) and the Mandatory Attachment Program (MAP). All these strategies are essentially designed to help the teeming population of unemployed youths in Nigeria to acquire some useful skills, which could help them to become self-reliant.

3.3.3. Problems and Challenges of Poverty Reduction Efforts

According to Ugoh and Ukpere (2009), corruption has bedeviled various antipoverty programs of government and the manifestations and problems associated with corruption in Nigeria have various dimensions. These corrupt practices include project substitution, misrepresentation of project finances, diversion of resources, and conversion of public funds to private uses among many others.

One other significant weakness in the policies and programs of poverty reduction in Nigeria is the failure to effectively target the poor as well as focusing on specific target community, and their specific poverty related problems in addressing them. To effectively reduce poverty, focusing on the poor could have come as targeting. This is not the case because the roles of the poor in Nigeria and their communities in poverty reduction have not been fully appreciated by the implements of the program. Hence, the reason why, despite the different policies that have been introduced, there is still a high incidence of poverty.

In addition, the nature and pattern of authority allocation or relationship within the local government for instance affects the policy implementation. In the present dispensation where there is no convincing and clear-cut line of duty, cold war, is fought silently between the heads of department and the supervisors, special assistant and political advisers who jostle for one political favor or the other from the chairman. Conflict usually arises among them over who supervises such policy/program. All these can frustrate a policy or program implementation.

3.4. The Informal Sector

A CBN/NISER collaborative workshop in 2001 defines the informal sector as that which operates without binding official regulations, as well as one who operates under official regulations that do not compel rendition of official returns on its operations or production process.

The workshop asserts that in general terms, an informal sector activity consists of enterprises which renders no account to any statutory bodies. Such enterprises comprise a heterogeneous set of activities. Characteristically, the activities cover almost every field of economic activity, ranging from petty trading and personal services to informal construction, transport, money lending, manufacturing, and repairs. The operators are generally of low level of education, risk takers, and accommodating.

3.5. Size and Composition of the Informal Sector in Nigeria

Generally, the global economic crisis of the past decades has been noted as the cause of enlargement of the informal sector in almost all developing countries including Nigeria. Estimates of the size of the informal sector in these countries appear to vary with fuzziness of the informal concept and across countries, but representative contributors place almost half of the urban workforce in developing countries in the informal sector. Leidholm and Mead (1987) for example, observed that 35 percent of manufacturing employment in Jamaica takes place in firms with fewer than 10 employees in the informal sector, while this figure is 90 percent for Sierra Leone. A survey carried out by the Central Bank of Nigeria (CBN), in collaboration with the Nigerian Institute of Social and Economic Research (NISER) and the Federal Office of Statistics (FOS) in 1998, put this figure at about 83 percent.

The composition of the informal sector in Nigeria is basically of two categories: informal manufacturing and non-manufacturing activities. The composition of non-manufacturing informal sector is as listed above. In table 2, the composition of the informal manufacturing sector in Nigeria is presented. According to the table, the dominant manufacturing activity in Nigeria is in food, beverages, and tobacco. This comprises of about 69 percent of all informal manufacturing activities. Other components of the informal manufacturing sector are: textile, 11.2 percent; wood products, 8.8 percent; paper products, 0.6 percent; chemicals and petroleum products, 0.5 percent; non-metallic mineral products, 0.8 percent; basic metal product, 1.6 percent; fabricated metal products, machinery and equipment, 2.2 percent.

Table 2: Distribution of Informal Manufacturing Enterprises in Nigeria by Activity, 1998.

Activity Unit	Number of Enterprises	Percentage
Food, Beverages and Tobacco	1,458,048	69.1
Textile and Wearing Apparel	236,736	11.2
Wood and Wood Products	186,535	8.8
Paper and Paper Products	12,404	0.6
Chemical, Petroleum, etc.	11,469	0.5
Non-metallic Mineral Products	16,533	0.8
Basic Metal Industries	34,127	1.6
Fabricated Metal Products, Machinery and Equipment	45,428	2.2
Others (including home-based manufacturing)	109,882	5.2
Total	2,111,162	100

Source: CBN/NISER/FOS Informal Sector Survey, 1998.

4. Methodology and Data

4.1 Methodology

This section includes, first, the granger causality test to determine the direction of causality. The next step is about the model building. Lastly, the robustness checks to ensure that the results are not spurious.

4.1.1 Granger Causality Test

This study utilizes Granger causality tests in investigating the causal relationship between poverty and the informal sector (Granger & Newbold 1974). A variable x is said to Granger-cause a variable y if, given the past values of y, past values of x are useful for predicting y.

Firstly, this study tests for Granger causality by regressing poverty on its own lagged values and on lagged values of the informal sector. Thereafter, test the null hypothesis that the estimated coefficients on the lagged values of poverty are jointly zero. Failure to reject the null hypothesis is equivalent to failing to reject the hypothesis that poverty does not Granger-cause informal sector.

Furthermore, the informal sector is regressed on its own lagged values and on lagged values of poverty. Thereafter, test the null hypothesis that the estimated coefficients on the lagged values of the informal sector are jointly zero. Failure to reject the null hypothesis is equivalent to failing to reject the hypothesis that informal sector does not Granger-cause poverty. The result of all the measurements of the informal sector and poverty is reported in Table 3. The result shows that the informal sector causes poverty. This helped in developing the models.

Table 3: Granger Causality Tests

MEASUREMENT	DIRECTION OF CAUSALITY	AIC	PROB>F	DECISION
INFORMAL SECTOR (CURRENCY DD MODEL)	Shadow---Infant mortality	2	0.1083	Accept null
POVERTY (INFANT MORTALITY)				
INFORMAL SECTOR (CURRENCY DD MODEL)	Shadow---CE	2	0.7867	Accept null
POVERTY (CONSUMPTN EXPENDITURE)				
INFORMAL SECTOR (CURRENCY DD MODEL)	Shadow---Water	5	0.1417	Accept null
POVERTY (WATER ACCESS)				
INFORMAL SECTOR (DIFFERENCE BTW INC. AND EXP.)	IS---Infant mortality	0	0.0215	Reject null
POVERTY (INFANT MORTALITY)				
INFORMAL SECTOR (DIFFERENCE BTW INC. AND EXP.)	IS---CE	0	0.0305	Reject null
POVERTY (CONSUMPTN EXPENDITURE)				
INFORMAL SECTOR (DIFFERENCE BTW INC. AND EXP.)	IS---Water	5	0.795	Accept null
POVERTY (WATER ACCESS)				

H_0: Informal Sector does not cause Poverty
H_1: Informal Sector causes Poverty

MEASUREMENT	DIRECTION OF CAUSALITY	AIC	PROB>F	DECISION
INFORMAL SECTOR (CURRENCY DD MODEL)	Infant mortality---Shadow	2	0.1222	Accept null
POVERTY (INFANT MORTALITY)				
INFORMAL SECTOR (CURRENCY DD MODEL)	CE--- Shadow	2	0.058	Accept null
POVERTY (CONSUMPTN EXPENDITURE)				
INFORMAL SECTOR (CURRENCY DD MODEL)	Water---Shadow	5	0.1878	Accept null
POVERTY (WATER ACCESS)				
INFORMAL SECTOR (DIFFERENCE BTW INC. AND EXP.)	Infant mortality---IS	0	0.1134	Accept null
POVERTY (INFANT MORTALITY)				
INFORMAL SECTOR (DIFFERENCE BTW INC. AND EXP.)	CE--- IS	0	0.1326	Accept null
POVERTY (CONSUMPTN EXPENDITURE)				
INFORMAL SECTOR (DIFFERENCE BTW INC. AND EXP.)	Water---IS	5	0.0973	Accept null
POVERTY (WATER ACCESS)				

H_0: Poverty does not cause Informal Sector
H_1: Poverty causes Informal Sector

4.1.2 The model

Based on economic theory and previous work in the literature, the baseline model (Model 1) in this study holds that poverty (POV) in Nigeria is a function of three main determinants, namely, the informal sector (IS), debt service (DS) and unemployment (UNEMP.). That is,

POV= f (IS, DS, UNEMP) (1)

Where the function *f (.)* captures the relationship between the dependent variable POV, and the independent variables IS, DS and UNEMP.

The formulation of equation (1) follows in the footsteps of many scholars who have thoroughly investigated the concept of poverty.

This study incorporates proxies of poverty due to the lack of data directly measuring poverty. These are infant mortality and consumption expenditure per capita. Nigeria's infant mortality rate has been estimated to be currently 99 per 1000 births, which shows that Nigeria has the thirteenth highest infant mortality rate in the world (CIA 2009). The infant mortality of children under the age of 5 was 112 per 1000 births in 2014. The reason for this high mortality rate is mostly due to mothers, not having enough money to take care of their children. Many children in Nigeria die as a result of malaria, diarrhea, tetanus and similar diseases. These diseases are preventable and curable, but because of poor health care facilities and lack of money far too many children die off from them. All these are the features of poverty (Okungbowa 2011).

Another Poverty indicator employed is real consumption expenditure per capita following previous studies by Ogun (2010) and Okojie (2002). The two studies employed real consumption expenditure as an alternative to per capita income on the basis of consensus in the literature that an expenditure measure of poverty is superior to income measures.

The size of the informal sector is measured using the currency demand method. This is based on the work of Cagan (1958), who estimated the determinants of the ratio of currency to ''broad money'' (or M2) for the United States. His estimates showed that the key driving factors in the demand for currency were per-capita income, the interest rate, and, importantly, the tax rate. The data for the currency demand method was derived from (Ademola & Bekoe 2012).

Also, GDP income/expenditure discrepancies are used in measuring the size of the informal sector (McAfee 1980). This is based on the assumption that the income measure of GDP is supposed to be the same as the expenditure measure, some economists have argued that any discrepancy between the two measures, specifically if income GDP is larger than expenditure GDP, indicates the existence of a "hidden" economy.

In several developing countries of the world, the debt burden is assuming an increasing importance as a cause of poverty. In such countries, servicing of the debt has infringed on the magnitude of resources needed for socioeconomic development Tomori & Adebiyi (2002). The productive sector such as agriculture, manufacturing etc. is equally constrained, leading to low productivity, low capacity utilization, under employment and low purchasing power thereby subjecting the masses of the people in abject poverty. In Nigeria, at the end of December 2000 external debt stood at US$28. 5 (about 80% of GDP), though, a debt pardon deal was brokered between Nigeria and her creditors (Paris Club) during the Obasanjo's regime, by 2011 debt portfolio was projected to represent 12% of GDP. The amount required to service this debt annually is enough to hamper government expenditure for the provision of social and physical infrastructure for the poor (Olowa 2012). Therefore, a positive sign is expected.

Unemployment is a contributing factor to poverty in Nigeria. There is a strong relationship between unemployment and poverty Abubakar (2002). When people are unemployed, their source of livelihood depletes over time. The cost of living increases and the standard of living begins to decline. The formal unemployment rate in Nigeria as estimated by the World Bank in 2007 was 4.9 percent and Nigeria ranked 61st across the worlds countries. A positive sign is expected.

In order to provide a comprehensive understanding of poverty in Nigeria, three additional variants of the baseline model are introduced. These variants draw their pertinence from the vast literature on poverty by identifying and including another set of three major determinants- inflation (INF), rural population (RP) and corruption (CORR). Indeed, this set has garnered attention among some researchers because of its perceived relevance for developing countries, especially. Models 2, 3 and 4 are developed to account for the aforementioned determinants:

$$Pov=f\,(IS, DS, UNEMP, RP) \qquad (2)$$

$$Pov=f\,(IS, DS, UNEMP, RP, INF) \qquad (3)$$

$$Pov=f\,(IS, DS, UNEMP, CORR) \qquad (4)$$

Although there are many other factors that may cause poverty, inflation is regarded as an influential factor in determining the poverty. The problem of poverty intensifies even more when the prices of commodities in general, and food in particular, increase. Several arguments have been made in support of the view that inflation increases poverty (Chaudhry and Chaudhry, 2008).

Location of residence also matters. In particular, due to more job opportunities in urban areas, poverty tends to be lower in urban than rural areas. A number of recent studies, including the World Bank (1990, 2001) and the African Development Bank (2002) have indicated that poverty in Africa (and other developing countries) is higher in rural areas than in urban areas. Some of the reasons advanced for this include that historically government policy has been biased against rural areas; rural areas are heavily dependent on agricultural production, which in Africa is characterized by low labor productivity and hence low incomes; and natural disasters such as flooding and drought tend to affect rural areas more heavily than they affect urban areas. One might expect a positive relationship will be associated with rural populations and poverty.

Corruption has been attributed as one of the causes of poverty in Nigeria. Nigeria ranked as the second most corrupt in the world, corruption aggravated the level of poverty of Nigerians in several ways (Abubakar 2002). Corrupt behaviors erode the institutional capacity of government to deliver quality public services; divert public investment away from major public needs into capital projects; lower compliance with safety and health regulations; and increase budgetary pressures on government (Gupta 2000). The above factors, which are caused by corruption, are in turn responsible for producing poverty. The CPI Score relates to perceptions of the degree of which corruption is seen by business people--a perfect 10.00 would be a totally corruption-free country. A negative sign is expected between poverty and corruption.

Models 1 through 4 present a theoretical framework that helps to learn about the relationship between poverty and its determinants. To conduct an empirical assessment of such a relationship, the econometric forms of equation (1), (2), (3) and (4) are respectively defined below:

$$POV_t = \beta_0 + \beta_1 IS_t + \beta_2 DS_t + \beta_3 UNEMP_t + \mu_t \qquad (5)$$

$$POV_t = B_0 + B_1 IS_t + B_2 DS_t + B_3 UNEMP_t + B_4 RP_t + \mu_t \qquad (6)$$

$$POV_t = \phi_0 + \phi_1 IS_t + \phi_2 DS_t + \phi_3 UNEMP_t + \phi_4 RP_t + \phi_5 INF_t + \mu_t \qquad (7)$$

$$POV_t = \Phi_0 + \Phi_1 IS_t + \Phi_2 DS_t + \Phi_3 UNEMP_t + \Phi_4 CORR_t + \mu_t \qquad (8)$$

4.1.3. Robustness Check

To ensure that our results are robust and do not suffer from spuriousness, a robustness check is conducted in two stages. First, different proxies for poverty and the informal sector are used. Second, a Jarque-Bera test is conducted.

Poverty and informal sector will be measured using with other variables. Informal sector will be measured with the currency demand method and the difference between the governments income and expenditure. Poverty will be measured using infant mortality, consumption expenditure per capita and access to potable water as proxies.

The Skewness/Kurtosis test of normality is based on the OLS residuals. The result obtained from the test shows that the residuals are normally distributed. Therefore, the residuals are uncorrelated. The Jarque-Bera (JB) test is carried out to check the validity of the result. The result in Table 4 shows that the residuals are normally distributed.

Table 4: Skewness/Kurtosis tests for Normality

Model	Obs	Pr (Skewness)	Pr (Kurtosis)	adj Chi 2(2)	Prob>Chi 2
1	35	0.9119	0.7273	0.13	0.9353
2	35	0.8816	0.8491	0.06	0.9712
3	35	0.583	0.4718	0.86	0.6506
4	19	0.1353	0.4661	3.15	0.2067

4.2 Data

The data for this study was obtained mainly from World Development Indicators (World Bank), UNCTAD Statistics (United Nations Conference on Trade and Development), the HPI (Human Perception Index) and data for the currency demand method (Ademola Ariyo and William Bekoe (2012). This study considers annual data mostly spanning from 1980 to 2014.

5. Results and Implications

5.1 Results

All results for models 1 through 4 are reported in Table 6.

Table 6: Regression Results (Infant mortality rate is used as a proxy for the dependent variable, poverty)

Independent variables	Model 1	Model 2	Model 3	Model 4
IS	0.75192	0.4883883	0.4653578	0.8075961
	(0.004)	(0.000)	(0.002)	(0.050)
Debt service	2.927088	0.909222	0.8690795	1.608536
	(0.003)	(0.048)	(0.000)	(0.399)
Unemployment	-1.290888	0.1355022	0.1092273	0.3536179
	(0.087)	(0.714)	(0.775)	(0.571)
Rural population		3.249609	3.278404	
		(0.000)	(0.000)	
Inflation			0.0412589	
			(0.728)	
Corruption				-0.08622
				(0.030)
N	35	35	35	19
$\bar{R}^2$	0.6448	0.9192	0.9168	0.7810
F	21.57	97.76	75.95	17.05
Prob>F	0.0000	0.0000	0.0000	0.0000

The value of the p statistics is in parenthesis, poverty is the dependent variable measured using infant mortality, Informal Sector (IS) is measured as the difference between income GDP and expenditure GDP.

In Model 1, the coefficient of the informal sector variable is positive. This indicates a positive and statistically significant relationship between informal sector and poverty. Consequently, ceteris paribus, a percentage point increase in informal sector activity (expressed as a percentage of GDP) leads to an approximately 0.75 percentage point increase in the poverty rate, on average. That is, as individuals engage in informal sector activities poverty grows. This is because the existence of the informal sector entails a loss in budget revenues. Consequently, reducing taxes and social security contributions paid. Therefore, the availability of funds to improve infrastructure and other public goods and services.

Furthermore, the coefficient of the debt service variable is positive and statistically significant. Specifically, holding all other factors constant, a percentage point increase in nation's debt servicing (expressed as a share of GDP) leads to about 2.93 percentage point increase in poverty, on average. This suggests that any upward movement in the amounts devoted by the Nigerian government in servicing debt will lead to a reduction in the funds that would have been allocated to poverty alleviation projects, and other infrastructural development projects aimed at improving the livelihoods of the nation's poor population.

Also, the coefficient of the unemployment variable suggests a negative relationship with the rate of poverty in Nigeria but remains insignificant across all models and specifications. Hence, holding all other factors constant, a percentage point increase in the unemployment rate leads to a 1.29 percentage point decrease in poverty, on average. Even though this is surprising in the general context of the literature, it is not strange in the Nigerian context because a reduction in the unemployment rate has largely not come from the poor population- most of whom are engaged in agriculture and several informal sector activities. This is probably why it is insignificant in explaining reductions in the poverty rate.

The adjusted coefficient of the determination ($\bar{R}^2$) for the model is 0.64. This implies that approximately 64% of the total variation in poverty is explained by the informal sector, the growth rate of debt service and unemployment rate on average.

The F- statistic which shows the overall fit of the model was statistically significant below the 1% significance level and this implies that the estimated equation is overall statistically significant.

In Model 2, we control for the effects of the rural population on the rate of poverty in Nigeria. After controlling for the share of the population living in rural areas, our informal sector variable remained significant and positively related to the rate of poverty. Thus, increases in informal sector would further lead to increases in poverty. Specifically, other things being constant, a percentage point increase in the informal sector activity leads to a 0.49 percentage point increase in poverty, on average.

Furthermore, the coefficient of debt service is positive. On this account, it indicates there is a positive and significant relationship between debt service and the poverty rate in Nigeria. This implies that increases in debt service would further lead to increases in poverty. As a result, ceteris paribus, an additional percentage point increase in the country's debt servicing as a share of GDP, causes the poverty rate to increase by 0.91 percentage point, on average.

Interestingly, after controlling for the share of population living in rural Nigeria, the coefficient of the unemployment rate variable turned out positive, but it is not statistically significant, even at the 10% level. However, the positive sign shows that, increases in the unemployment rate would further lead to increases in poverty.

Specifically, ceteris paribus, a percentage point increase in the unemployment rate leads to a 0.14 percentage point increase in poverty, on average. The effect of this is that when people are unemployed, their level of income reduces, which in turn reduces the standard of living, but it remains insignificant as gains in employment have not been generally and evenly spread across the different income classes.

The newly introduced rural population variable is however positive and statistically significant. This therefore suggests that a positive relationship between the percentage of people living in the rural areas and poverty. This did not come as a surprise, given the evidence in the literature which suggests a positive correlation between rural areas and poverty. Specifically, we find that all other things being constant, a percentage point increase in rural population leads to a 3.25 percentage point increase in poverty, on average. Generally, people living in rural Nigeria do not have access to basic amenities and good infrastructural services which will enable them to pull themselves out of poverty.

The $\bar{R}^2$ which measures the overall fit of the model is 0.92 and it is statistically significant at the 1% level, suggesting that the variables are jointly significant in explaining the model.

In model 3, we attempt to control for the effects of inflation in eroding the value of money and thus increasing poverty. After controlling for inflationary effects, the coefficient of the informal sector remained positive. Suggesting that all other things equal, a percentage point increase in informal sector would further lead to about 0.47 percentage point increase in poverty. And it is statistically significant below the 1% level.

Moreover, the coefficient of debt service remained positive, indicating a positive relationship between debt servicing and poverty. Even though statistically insignificant, we find, consistent with our a priori expectation that a percentage point increase in debt servicing leads to a 0.87 percentage point increase in poverty, on average, all other things equal.

In addition, the coefficient of the unemployment rate remained positive. This indicates a positive relationship between the unemployment rate and poverty. Again, even though statistically insignificant, the relationship implies that all other things being constant, a percentage point increase in the unemployment rate leads to a 0.11 percentage point increase in poverty, on average.

The coefficient of inflation variable also turned out positive. It shows a positive relationship exists between the inflation rate and poverty. As a result, increases in the inflation rate would further lead to increases in poverty. This follows the a priori expectation, but is found to be statistically insignificant. Hence, ceteris paribus, a percentage point increase in inflation rate leads to a 0.04 percentage point increase in poverty, on average. The fact that the inflation variable turned out insignificant did not surprise as much because poor households often spend on consumption than on savings and as such are able to escape the 'weakening purchasing power' effects of inflation on savings. Therefore, even though inflation may be positively related to the rate of poverty, it is insignificant in Nigeria.

We also found a positive relationship between the poverty rate and the rural population, consistent with the literature. Specifically, we found that all other things being constant, a percentage point increase in rural population leads to a 3.28 percentage point increase in poverty, on average. This is explained by the absence of life-enhancing opportunities needed for households to move out of poverty in rural areas.

The $\bar{R}^2$ for the model was quite high at 0.92. Suggesting that approximately 92% of the variation in poverty rate in Nigeria is explained by the variables that is entered the model. The F-statistic which gauges the overall goodness of fit was highly significant below the 1% level. Thus the model could be said to be significant, overall.

In Model 4, we tease out the effects of corruption on poverty by including a corruption variable. Upon inclusion of the corruption variable, the coefficient of the informal sector variable remained positive. The result indicates a positive and significant relationship between informal sector and poverty. This implies that increases in informal sector would further lead to increases in poverty. Therefore, ceteris paribus, a percentage point increase in informal sector leads to a 0.81 percentage point increase in poverty, on average.

Furthermore, the coefficient of debt service also remained positive. It shows that a positive relationship exists between debt service and poverty. On this account, increases in debt service would further lead to increases in poverty. This follows the a priori expectation, but is found to be statistically insignificant. Thus, all other things being constant, a percentage point increase in debt service leads to a 1.61 percentage point increase in poverty, on average.

Also, the coefficient of the unemployment rate is positive. This indicates a positive relationship between the unemployment rate and poverty. Consequently, increases in the unemployment rate would further lead to increases in poverty. This follows the a priori expectation, but is found to be statistically insignificant. Thus, all other things being constant, a percentage point increase in the unemployment rate leads to a 0.35 percentage point increase in poverty, on average.

The coefficient of corruption is negative. There is an inverse relationship between corruption and poverty. For this reason, increases in the level of corruption would further lead to increases in poverty. This follows the a priori expectation and is found to be statistically significant. As a result, ceteris paribus, a percentage point increase in the level of corruption leads to a 0.09 percentage point increase in poverty, on average.

The $\bar{R}^2$ for the model appears to be 0.78. Thus, the independent variables in our regression could be said to correctly explain approximately 78% of the variation in the dependent variable. The F- statistic also remained significant below the 1% level indicating that the variables are jointly statistically significant.

Table 7: Robustness Check 1 (Infant mortality rate is used as a proxy for the dependent variable, poverty)

Independent variables	Coefficient	P>|t|
IS	0.4349779	0.000
Debt service	0.6298985	0.000
Unemployment	-0.273869	0.327
Inflation	0.0482563	0.08
Rural population	0.651194	0.000
n		35
Adjusted R^2		0.9587
F		158.82
Prob>F		0.0000

Table 7 above shows that the coefficient of the informal sector measured with the currency demand method is positive. This indicates a positive and statistically significant relationship between informal sector and poverty. Therefore, increases in informal sector would further lead to increases in poverty. This follows the theoretical expectation and is found to be statistically significant. Thus, all other things being constant, a percentage point increase in the informal sector leads to a 0.43 percentage point increase in poverty, on average.

Besides, the coefficient of debt service is positive. It suggests that there is a positive relationship between debt service and poverty. Hence, increases in debt service would further lead to increases in poverty. This follows the theoretical expectation and is found to be statistically significant at the 10 percent level. Thus, a percentage point increase in debt service leads to a 0.63 percentage point increase in poverty, on average.

In addition, the coefficient of the unemployment rate is negative. There is an inverse relationship between unemployment rate and poverty. As a result, increases in the unemployment rate would further lead to decreases in poverty. This does not follow the a priori expectation and is found to be statistically insignificant. Thus, ceteris paribus, a percentage point increase in the unemployment rate leads to a 0.27 percentage point decrease in poverty, on average.

The coefficient of inflation is positive. Therefore, there is a positive relationship between inflation rate and poverty. For this reason, increases in the inflation rate would further lead to increases in poverty. This follows the a priori expectation and is found to be statistically significant. Thus, ceteris paribus, a percentage point increase in inflation rate leads to a 0.05 percentage point increase in poverty, on average.

The coefficient of rural population is positive. There is a positive relationship between the percentage of people living in the rural areas and poverty. As a result, increases in the percentage of people living in rural areas would further lead to increases in poverty. This follows the theoretical expectation and is found to be statistically significant. Hence, all other things being constant, a percentage point increase in rural population on average leads to a 0.65 percentage point increase in poverty, on average.

The $\bar{R}^2$ for this model appears was also quite high; 0.96. Thus, the model is said to be of a good fit as the independent variables explain about 96% of the variation in the dependent variable. The F- statistic which gives a much better measure of the goodness of fit was also statistically significant below the 1% level.

Table 8: Robustness Check 2 (Consumption expenditure per capita is used as a proxy for the dependent variable, poverty)

Independent variables	Coefficient	P>|t|
IS	0.0896592	0.239
Debt service	0.0746055	0.061
Unemployment	0.0550238	0.873
Inflation	0.0603686	0.560
Rural population	0.2882651	0.305
n		35
Adjusted R^2		0.908
F		317.96723
Prob>F		0.0000

The coefficient of the informal sector measured by the difference between income, GDP and expenditure GDP is positive. A positive relationship exists between the informal sector and poverty. Accordingly, increases in informal sector would further lead to increases in poverty. This follows the a priori expectation, but is found to be statistically insignificant. Hence, all other things being constant, a percentage point increase in the informal sector leads to a 0.09 percentage point increase in poverty, on average.

Furthermore, the coefficient of debt service is positive. This indicates a positive and significant relationship between debt service and poverty. As a result, increases in debt service would further lead to increases in poverty. Thus, a percentage point increase in debt service will lead to a 0.07 percentage point increase in poverty, on average.

Moreover, the coefficient of the unemployment rate is positive. There is a positive relationship between the unemployment rate and poverty, but is found to be statistically insignificant. That being the case, increases in the unemployment rate would further lead to increases in poverty. Thus, ceteris paribus, a percentage point increase in the unemployment rate will lead to a 0.06 percentage point increase in poverty, on average.

The coefficient of inflation is positive. A positive relationship is between the inflation rate and poverty. This shows that increases in the inflation rate would further lead to increases in poverty, but is found to be statistically insignificant. Thus, ceteris paribus, a percentage point increase in the inflation rate will lead to a 0.06 percentage point increase in poverty, on average.

The coefficient of rural population is positive. This indicates a positive relationship is between the percentage of people living in the rural areas and poverty. Hence, increases in the percentage of people living in rural areas would further lead to increases in poverty, but is found to be statistically insignificant. Therefore, all other things being constant, a percentage point increase in rural population will lead to a 0.29 percentage point increase in poverty, on average.

The $\bar{R}^2$ for the model is also 0.91. Thus, the model is said to be of a good fit as the independent variables explain about 91% of the variation in the dependent variable. The

F- statistic which gives a much better measure of the goodness of fit was also statistically significant below the 1% level.

Table 9: Robustness Check 3 (Consumption expenditure per capita is used as a proxy for the dependent variable, poverty)

Independent variables	Coefficient	P>|t|
IS	0.134453	0.272
Debt service	0.1259168	0.776
Unemployment	-0.0144491	0.966
Inflation	0.057835	0.015
Rural population	0.3933753	0.186
n		35
Adjusted R^2		0.833
F		385.4762
Prob>F		0.0000

From the table above, the coefficient of the informal sector measured by the currency demand method is positive. This indicates a positive relationship between informal sector and poverty. In this regard, increases in informal sector would further lead to increases in poverty, but is found to be statistically insignificant. Thus, all other things being equal, a percentage point increase in the informal sector will lead to a 0.13 percentage point increase in poverty, on average.

In other respects, the coefficient of debt service is positive. It shows a positive relationship is between the growth rate of debt service and poverty. This denotes that increases in debt service would further lead to increases in poverty, but is found to be statistically insignificant. As a result, ceteris paribus, a percentage point increase in debt service will lead to a 0.13 percentage point increase in poverty, on average.

Plus, the coefficient of the unemployment rate is negative. An inverse relationship is between unemployment rate and poverty. Therefore, increases in the unemployment rate would further lead to decreases in poverty. Thus, ceteris paribus, a percentage point increase in the unemployment rate will lead to a 0.01 percentage point decrease in poverty, on average.

The coefficient of inflation is positive. This indicates a positive relationship between inflation rate and poverty. Hence, increases in the inflation rate would further lead to increases in poverty. This follows the a priori expectation and is found to be statistically significant. Thus, all other things being constant, a percentage point increase in the inflation rate will lead to a 0.06 percentage point increase in poverty, on average.

The coefficient of rural population is positive. It indicates a positive relationship between the percentage of people living in the rural areas and poverty. This implies that increases in the percentage of people living in rural areas would further lead to increases in poverty. This follows the expected relationship, but is found to be statistically insignificant. Thus, all other things being constant, a percentage point increase in rural population will lead to a 0.39 percentage point increase in poverty, on average

The $\bar{R}^2$ for the model appears to be 0.83. Thus, the model is said to be of a good fit as the independent variables explain about 83% of the variation in the dependent variable. The F- statistic which gives a much better measure of the goodness of fit was also statistically significant below the 1% level.

5.2 Implications

The results show that the informal sector drives poverty in a positive and significant relationship, although its impacts remain small in most specifications. That is, as the informal sector expands in Nigeria, poverty also expands. Therefore, to tackle the scourge of poverty, decision makers could implement policies intended to curtail the development of the informal sector.

To start with, business regulations can affect the decisions people make regarding whether to operate formally or not. The Nigerian government could reduce the bureaucratic procedures by ensuring the simplification of the cost of registering and provision of licenses which will encourage the businesses to declare themselves. Registration and taxation should be made easier and even offering incentives to those businesses that pay taxes.

Furthermore, the design and implementation of programs which would focus on training and providing support to the small business owners could prove impactful throughout the Nigerian economy. Indeed, such programs have the potential of fostering both the creation and development of small businesses in the formal sector.

The government could also work towards building the public's trust, because people will be more willing to participate in formal activities if they believe that their contributions will positively affect their wellbeing, this can be done by ensuring the efficient use of the taxes or by providing social services like a community bore-hole which could provide them with clean water or by building health centers etc.

A very crucial issue that has to be addressed is corruption because this is a well-known factor that could mitigate the prospects of the economy because irrespective of the implications and policies recommended, if transparency is lacking in any sector and the economy in general, then the idea of the reduction of poverty remains vague. The Nigerian government has to put in place policies that will help curb corruption by enacting anti- corruption laws and adopting codes of [1]conducts and ethical standards in both the public and private sectors.

[1] Water access was used as a proxy for poverty but out of consideration for space and the limited data set, the result can be found Table 10 and 11 in the appendix

6. Conclusion

This study attempted to analyze the relationship between poverty and the informal sector in Nigeria. The contribution of the informal sector, unemployment rate, inflation, rural population, debt service and corruption were used to determine the level of poverty. From the results obtained, analyzed and interpreted it can be concluded that the informal sector, unemployment rate, inflation, rural population, debt service and corruption are important in influencing the level of poverty in Nigeria.

It was found that the size of the informal sector determines the level of poverty. To this regard, in tackling the scourge of poverty, decision makers in Nigeria could implement policies intended to curtail the development of the informal sector. Therefore, policies like reduction in bureaucratic processes, reduction in the level of corruption and skill development can be implemented.

This study can be improved by considering other variables that affect poverty like level of education, democracy, political terror. The study can be further developed by considering other developing countries or a group of developing countries.

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Appendix

Table 5: Summary Statistics

	IS1	*IS2*	*INF. MORT.*	*WATER ACCESS*	*CE % GDP*	*UNEMP*	*INFLATION*	*RUR.POP*	*CPI*	*debt service*
Mean	67.22208589	56.9904	185.5057143	54.1	77.57612	8.78286	19.7419278	66.12497	1.90789	5.661320555
Standard Error	4.29179974	2.726756	5.541596625	1.708244713	1.358791	0.99062	3.02900018	1.22365	0.13237	0.774621762
Median	60.71342139	56.38897	205.1	54.2	79.75441	6.4	12.2170072	66.753	1.9	4.609622109
Standard Deviation	25.39062968	16.13171	32.78452776	8.541223566	8.038719	5.86061	17.9198067	7.239213	0.57699	4.582724144
Sample Variance	644.6840754	260.232	1074.825261	72.9525	64.621	34.3468	321.119473	52.40621	0.33292	21.00136058
Kurtosis	0.12739479	0.891836	-0.698669504	-1.22340682	0.341149	0.0171	1.78867871	-0.99775	-0.4995	-0.757932808
Skewness	0.836831059	0.594982	-0.895561867	-0.047003052	-0.09012	0.95551	1.70123586	-0.15227	-0.4633	0.513001052
Range	94.38925526	71.60388	102	27.7	37.48792	22	67.4532786	24.972	2.01	15.80862295
Minimum	35.28829977	32.17236	116.6	39.9	60.68243	1.9	5.38222365	53.058	0.69	0.092821398
Maximum	129.677555	103.7762	218.6	67.6	98.17034	23.9	72.8355023	78.03	2.7	15.90144435
Sum	2352.773006	1994.664	6492.7	1352.5	2715.164	307.4	690.967474	2314.374	36.25	198.1462194
Count	35	35	35	25	35	35	35	35	19	35

IS1 is Informal sector measured as the difference between income GDP and expenditure GDP, IS2 is Informal sector measured as currency demand, inf. mort. represents infant mortality rate.

WATER ACCESS RESULT

Table 10: Reression Result 1: Informal Sector measured as a difference between government income and revenue

Variable	Coefficient	P>|t|
IS	0.0318109	0.135
Debt service	0.1982115	0.044
Unemployment	0.0789768	0.052
Inflation	0.0129228	0.392
Rural population	0.438699	0.000
n		25
Adjusted R^2		0.9884
F		409.36
Prob>F		0.0000

Table 11: Regression Result 2: Informal Sector measured as currency demand.

Variable	Coefficient	P>|t|
IS	0.0060714	0.747
Debt service	0.190954	0.069
Unemployment	0.083718	0.063
Inflation	0.003653	0.822
Rural population	0.398435	0.000
n		25
Adjusted R^2		0.9870
F		364.39
Prob>F		0.0000