CHAPTER ONE
INTRODUCTION

1.1 The Problem

Corruption constitutes one of the major obstacles to economic growth. It misdirects capital expenditure, shortens factor productivity efficiency and distorts consumers' tastes for goods and services. In Nigeria, the average annual growth rate of capital expenditure which was 35% in 1985-1989, increased sharply to 37% and 50% during 1990-1994 and 1995-1999 and then declined steadily to 19% in 2005-2010. Over the same periods, productivity growth stood at 10% in 1985-1989, declined to 3% and 2% in 2005-2009 and 2010-2011 (CBN 2010). Stunted growth recorded during these periods was attributed to corruption. The World Bank (2004) estimated that more than US$1 trillion is paid in bribes for business transactions each year in most developing countries. Existing evidence showed that African countries exhibited relatively high levels of corruption, which constituted a major constraint to efforts, aimed at efficiently allocating resources to growth enhancing projects (Baliamoune-Lutz and Ndikumana 2007, Elhiraika and Ndikumana 2007).

Economic growth is accompanied by persistent increase in income and output. Evidence have shown that corruption and economic growth are negatively correlated. Studies conducted by Mauro (1995), Gyimah-Brempong (2000), Keefer and Knack (1997), Li et al. (2000) and Haque and Kneller (2004) showed that corruption impacted negatively on growth and skewed public funds away from growth-promoting areas towards other types of projects that are less productivity enhancing[1]. A number of studies, for example, (Tanzi 2002; Svensson 2005; Gyimah-Brempong 2002; Aigbokhan 1998; IPSG 2003) have emphasized the impact of corruption on the quality of public infrastructures in less developed countries. Findings from these studies have shown that public funds and resources that are earmarked for infrastructures and development programmes are embezzled, misappropriated, or otherwise severely depleted through kickbacks and over-invoicing by public officers. Corruption is ubiquitous in less developed countries to the extent that developed nations are not willing to

[1] .Money meant for viable projects such as health, education and industrial development are diverted by corrupt officials thereby impoverishing the people.

extend loans or give aids to support their development programmes[2]. Aids/grants in whatever form was out rightly cancelled or suspended from Africa as it was discovered that the money granted ended up in corrupt hands, which invariably ran opposite to the objective of growth (Anoruo and Braha 2004).

The literature have shown that corruption is clandestine in nature, an act perpetrated in secret, completely away from the glare of publicity (Dreher et.al 2004; Chakrabarti 2000). Generating functional data to analyze corruption became difficult and cumbersome. In view of this, several organizations have developed a corruption perception index across a wide range of countries to assessed the pervasiveness of corruption. These indices are not free of problems. One of the problem identified was the ordinality of the indices and the difficulty of assigning a meaningful economic interpretation to them. In addition the index concentrated only on the demand side of corruption leaving out the supply side (Salisu 2000).

Transacting business in corrupt environment raised a fundamental question. Evidence suggested that corruption created major impediments to doing business in countries where it is prevalent. An investor wishing to start a business would have to meet the financial requirements of business[3]. Doing Business (2008) reports revealed that the cost of transacting business in African countries was higher compared to other parts of the world. In Angola, Benin, Burundi, Cameroon, Congo Republic and Nigeria, it took an average of 343.7%, 195.0%, 251.0%, 129.2%, 150.1% and 380.8% respectively, of annual income per capita to transact a business. However, the minimum monthly capital required to transact business amounted to 29.0%, 16.3%, 20.9%, 10.8%, 12.5%, and 31.7% respectively, of income per capita for Angola, Benin, Burundi, Cameroon, Congo and Nigeria. Comparing the cost ranking with developed countries such as Singapore, New Zealand and United States. In Singapore, it took 0.8% of annual income per capita to transact business. In New Zealand and U.S.A, it took 0.1% and 0.8% respectively. However, the minimum monthly capital required to transact a business amounted to 0% for Singapore, New Zealand and United States. High

[2]. It was observed that the money extended to African countries in the form of Aids/grants found its way back to the developed countries banks by corrupt officers in government. See Ndikumana (2007) for detail analysis.
[3]. Doing Business, 2008 reported that the financial commitment at each business stage determines ease of doing business.

inflation rate, corruption and complex bureaucratic procedures for business development were cited as fundamental reasons for high cost of transacting business in African countries.

The works of Mauro (1996), Tanzi and Davoodi (1997) supported the assertion that corruption impacted negatively on national output, private investment and government expenditure. Oftentimes, firms, individuals and foreign investors offer bribes to government officials in order to gain access to the market, contracts or supply of goods and services. Literatures have also shown that corruption pushed up transaction costs as it created distortions in investment plans and decision-making, raised firms cost of production and prices of goods and services, lowered prospects for profitability and triggered macroeconomic instability (Baliamoune-Lutz and Ndikumana 2007; Mauro 1996; Tanzi and Davoodi 1997). Traces of corruption were found in ten (10) major ministries in Nigeria where more than ₦23billion was lost in the Federal ministries in 2001 (Nwaobi 2006). Corruption in Nigeria could be explained within the context of the divergent relationship between real per capita income and real expenditure per capita growth. The real per capita income measured the market value of income received by each individual of a population. However, the share of income apportioned to each person in the economy is relatively low compared to the real expenditure per capita growth. By implication, the gap between real per capita income and the share of income apportioned to each person is covered by rent-seeking, skill differentials, inflation-induced distribution of income between high-income and low-income, producer versus consumer households and corrupt practices.

Studies have shown that persistent and sustainable growth in productivity drives economic growth (Barro and Sala-i-Martin 1999; Szirmai 2005; Fagerberg 2005; Niosi 2002). Productivity growth in the context of Nigeria is stunted due to inappropriate innovation system directed at raising productivity, ineffectiveness of law and order to create a conducive atmosphere for raising quality productivity and corruption. Corruption affects the marginal productivity of labour and capital, and at the same time reduce their efficiency by diverting their productive attention to rent-seeking activities (Ogun 2013). The final resting place of corruption-productivity gap burden is on growth. It is rare to get things done in public and private institutions without greasing the hands of officials concerned. Demanding, receiving, or offering gratification for services rendered or to be rendered, payments for work not

executed, over-invoicing of contracts, and payments of overnight travelling allowances for journeys not made by public officers, are practical examples of corrupt activities found in public offices[4]. With corruption, economic development cannot be sustained. Literatures have shown that corruption is detrimental to state efficiency, hampers budget equilibrium, diminishes expenditure efficiency and distorts its allocation between different budgetary functions (Mauro 1995; Obayelu 2007).

1.2 Objectives of the study

This study is anchored on the following three (3) objectives:

(i) to investigate the impact of corruption on productivity growth in Nigeria.

(ii) to analyze the effect of corruption on economic growth through productivity growth in Nigeria.

(iii) to ascertain the determinants of corruption in Nigeria.

1.3 Justification of the study

There exist a plethora of studies assessing the relationship between corruption and economic growth but findings from these studies have not only been diverse but also conflicting. This implied that views on corruption-economic growth nexus remained polarized among economists. There are two branches of literatures on corruption-growth relationship. There is a branch of literature which suggested that corruption promotes economic growth. Proponents of this view are Leff (1964), Huntington (1968), Summers (1977) and Lui (1985). They were of the opinion that corruption acts as stimulant to economic growth ('greases the wheel' of growth) and help reduce bureaucratic inefficiency. The justification behind this thought was that some degree of corruption may be required to achieve optimal allocation of resources. By implication, corruption was hypothesised to have the potency of making an economic agent more efficient in accelerating the pace of jobs and in the end promotes economic growth. The other branch of literature refuted the 'grease the wheel hypothesis' and contended that corruption exerts adverse effects on long-term economic growth and sustainable development. A host of scholars and international organizations constituted the proponents of this view. Specifically, Amaro-Reyes (1983), Mauro (1995), UNDP (1997), Wei (1997), Kaufmann (1997), Scheifer and Vishny (1993), Tanzi and Davoodi (1997),

[4]. The financial times of London (23rd July, 1999) revealed that the total amount of money looted by public officers in Nigeria between 1985 and 1999 totalled ₦11.80 trillion. Also relevant are IPSG (2003), Paul Collier (2013) and The Punch Newspaper, Saturday December 6, 2014.

World Bank (2000) among others upheld the opinion that corruption has a corrosive and destructive effect on economic growth and development. The transmission mechanism of these adverse effects include decline in domestic and foreign investment, rise in production costs, misallocation of national resources, increase in poverty and widening income inequality and uncertainty in decision making, among others. Very few empirical studies supported the position of the first school of thought. However, much of empirical works on corruption-growth relationship have tilted to the position of the second school of thought. This study attempted to fill the theoretical gap by exploring the relevancy of the two schools of thought in the context of Nigerian economy.

The second justification for the study can be explained within the context of methodological framework of modelling approach. Different models have been used to explain corruption. These include economic growth, games theory, multiple indicators multiple causes (MIMIC) and simulation models. These approaches of modelling corruption fell short of empirical evidence and lacked a functional data that may assist in putting the various approaches into comparative perspective[5]. A large number of existing studies on corruption-growth relationship have been modelled using cross country circumstances and data to ascertain its pervasiveness and determinants. This study slightly departed from this common approach by incorporating corruption into the growth equation through the channel of productivity within the context of Nigerian economy.

There are many studies on the determinants of corruption in Nigeria either at local, state or national level using documentary evidence[6], but not much has been done using survey to capture corruption determinants. Most studies on corruption utilized the indices of corruption designed by international organizations such as Transparency International (TI), International Country Risk Guide (ICRG), and World Governance Indicator (WGI). These indices are perception-based ordinal ranking which were adjudged to be biased. Apart from the studies conducted by Aliyu (2007), Salisu (2000) and Nwaobi (2006) on Nigeria's corruption analysis, very few have extensively analyzed the determinants of corruption from cultural, historical

[5]. Examples of Economic growth model are (Murphy 1993; Mandapaka 1995; Mauro 1997; Bardhan 1997; Triole 1996; Hellman 2000), Game theoretic (Andvig 1990; Laffont 1991; Basu 1992; Mookherjee 1995, Acemoglou 2000), MIMIC (Weck 1983; Frey 1984; Balasa 1985; Salvatore 1991; Salisu 2000; Greenaway 1994; Loayza 1996; Schneider 1997; Giles 1999) and Simulation models (Turnovsky 1995; Jain 1998; Stapenhurst 1999; Luna 2002; Situngkir 2003).

[6]. For detail analysis of the determinants of corruption in Nigeria, see for example (Olopoenia 1998; Yusif 2000; Salisu 2000; Nwaobi 2006; Aliyu and Oludele 2008).

and institutional perspective. As a result of the gap created by modelling corruption using cross country data, which makes it difficult to control for a number of factors such as cultural, historical and institutional differences across observations informed the survey of corruption in public and private sectors of the economy to capture its determinants. This study investigated how these factors impacted on Nigeria's corruption-growth relationship.

1.4 Methodology and Data Sources

This section gives a brief account of the methodology used in the study. A detailed analysis of the methodology adopted could be found in sections 4.2, 4.3 and 7 respectively. Given the nature of the study, two approaches were pursued in addressing the set objectives: formal econometric analysis (co-integration and error correction mechanism) and survey technique. The time series properties of the variables used in the model were examined by conducting the tests for stationarity and cointegration. The test for stationarity was to examine the order of integration of the variables, while that of cointegration was to check for the existence of cointegrating relationship between the independent and dependent variables. The study employed Johansen test[7] to determine the long- run relationship among the variables in the equations. If cointegration is established, the relationship will be most efficiently represented by an error-correction model (ECM). The ECM will not only facilitate the analysis of the short run impact of cointegrating variables on the dependent variable, but will also suggest the speed of adjustments to long run equilibrium. Some obstacles were encountered in the estimation of productivity and growth determinants. This relate to data unavailability. Some of the variables cannot be estimated directly, hence they were proxied. National system of innovation (NSI) was proxied by the share of research and development in total government spending (Actual spending). Law and order (LAWOR) was proxied by the proportion of government expenditure on security (Actual spending). Tastes of consumers (TRGD) was proxied by terms of trade. This captured the tastes for foreign and domestic goods. All econometric procedures were conducted within the provisions of the E-view 7.0 software. The data employed for this analysis spanned the period 1980 to 2011. The data were obtained from the Central Bank of Nigeria (CBN), *Statistical Bulletin* (various issues), National Bureau of Statistics, *Annual Abstract* (various issues), United Nations Conference on Trade and Development (UNCTAD),

[7]. Johansen test is much more convenient than the Engle-Granger test for unit roots, which is based on the Dickey-Fuller test.

Handbook of Statistics, International Monetary Fund, *International Financial Statistics*(various issues), World Bank Development indicator (on-line) and Transparency International website.

In addition, a survey of corruption in the public and private sectors in Nigeria was undertaken to ascertain its determinants. The study population comprised of public and private sector workers in Lagos and Abuja from which the sample was drawn. However, it was practically impossible to take a complete and comprehensive study of the population because of the nature and dispersion of the elements of the population. Samples used for the study were selected from ten (10) local governments area in Lagos and Federal Civil Service (both public and private), Abuja. The total questionnaire administered in Lagos and Abuja was three thousand (3,000). From the total questionnaire administered, two thousand five hundred (2,500) were returned, correctly filled ones totalled one thousand nine hundred and seventy six (1,976), badly filled summed five hundred and twenty four (524). The correctly filled questionnaire were used for the study. Lagos and Abuja was chosen because both locations are thick commercial nerve centres and contain large concentration of workers. Convenience sampling technique provided the sampling method used for the survey.

Convenience sampling is a non-probability sampling technique where subjects are selected based on accessibility and proximity to the researcher. The subjects are selected because they are easy to recruit for the study and the researcher did not consider selecting subjects that are representative of the entire population. In all forms of research, it would be ideal to test the entire population, but in most cases, the population is just too large that it is impossible to include every individual. This is the reason why we rely on sampling techniques like convenience sampling. This study used convenience sampling technique because it is fast, inexpensive, easy and the subjects are readily available.

The choice of convenience sampling is not just because it is easy to use, but it has other research advantages. In pilot studies, convenience sample is usually used because it allows the researcher to obtain basic data and trends regarding his study without the complications of using a randomized sample. This sampling technique is also useful in documenting that a particular quality of a substance or phenomenon occurs within a given sample. Such studies are also very useful for detecting relationships among different phenomena.

The most obvious criticism about convenience sampling is sampling bias and that the sample is not representative of the entire population. This may be the biggest disadvantage when using a convenience sample because it leads to more problems and criticisms. Systematic bias stems from sampling bias. This refers to a constant difference between the results from the sample and the theoretical results from the entire population. It is not rare that the results from a study that uses a convenience sample differ significantly with the results from the entire population. A consequence of having systematic bias is obtaining skewed results.

Another significant criticism about using convenience sample is the limitation in generalization and inference making about the entire population. Since the sample is not representative of the population, the results of the study cannot speak for the entire population. This results to a low external validity of the study.

1.5 Scope of the study

This study covered a period of 31 years from 1980 to 2011. The choice of the base year (1980) and end of period (2011) was premised on the exigency of the quantitative nature of economic growth and corruption. In effect, the work needed a sufficiently large sample size particularly in an environment where quarterly data are not available. Moreover, the period was sufficiently long in order to cover major political, social and economic events in Nigeria. The study focused on the extortive and transactive corruption, because all other forms are offshoots of these two fundamental types. This period was chosen because corruption activities became more pervasive and ubiquitous in all facets of economic life in Nigeria.

1.6 Organization of the Study

This study is divided into eight (8) chapters. Chapter 2 focused on the background of Nigeria's economic environment as regards historical evolution, trends of corruption, business environment as well as regulatory environment. Chapter 3 reviewed both theoretical and empirical issues as regards definitional differences in corruption, causes and indicators as well as measurement issues. Chapter 4 analyzed the theoretical framework and methodology of the study. The analysis of productivity growth, conceptual and measurement issues were discussed in chapter 5. Chapter 6 analyzed the estimation procedure and analytical technique for growth. Chapter 7 focused on data presentation and analyzed the survey data while Chapter 8 rounded up the study with the summary of findings, conclusion and recommendations.

CHAPTER TWO

BACKGROUNG TO THE STUDY

2.1 Introduction

This chapter provides background information on Nigeria's economic environment and also proposed a systematic analysis of the objectives of the study. It explains the composition of natural resource endowment and sectoral contribution to the GDP. The chapter further explains the major problems confronting the stability of the economy and the policy framework put in place to address the defective structures confronting the economy. Business environment relating to corrupt practices and regulatory framework guiding corruption in Nigeria were also discussed in this chapter. The chapter concluded with an overview of recorded cases of corruption in Nigeria and the position it occupied in the world ranking by Transparency International.

2.2 Nigeria's Economic Environment : An Overview

Nigeria's population as at 2007 stood at an estimated 148 million and by this, it accounted for over half of West Africa's population. It occupied a land mass of 923.8 thousand square kilometre, ranging from southern coastal swamps to tropical forests, opens woodlands, grasslands, and semi-desert in the far north. Nigeria is richly endowed with vast amount of natural resources which included oil and natural gas, tin, columbite, iron ore, coal, limestone, lead, zinc, etc. At the time of political independence in 1960, Nigeria was known for her exports of agricultural products, which included groundnuts, yams, cassava, sorghum, millet, rice, palm oil, cocoa, cotton, beans, timber, and hides and skins. The major industries by types are textiles, cement, food production, footwear, metal products, and beer, detergents and car assembly (Adedipe 2004). Agriculture was the dominant sector of the economy in the 1960s. It accounted about 70% of the Gross Domestic Product (GDP), employed over 60% of the working population, and accounted for about 90% of foreign earnings and Federal Government revenue. The early period of post-independence up to the middle of 1970s recorded a rapid growth in industrial capacity and output, as the contribution of the manufacturing sector to GDP stood at 36.2%. This pattern changed when oil suddenly became of strategic importance to the world economy through its supply-price nexus, as shown in Table 2.1. Ever since the time crude oil was discovered in large quantities in Nigeria, it became the dominant resource

base of the economy. On-shore oil exploration accounted for about 65% of total production, while the remaining 35% represented offshore production (Adedipe 2004). The massive increase in oil revenue was as a result of the Middle-East war of 1973, which created a windfall gain for Nigeria. Following this, there was a dramatic shift of policy from a holistic approach to a benchmarking type, which anchored governmental spending to the outcome of the oil sector.

Table 2.1:Average Sectoral Contribution to GDP at Current Basic Prices, 1960- 2011(%)

Sector	1960-1970	1980-1990	2000-2011
Agriculture	55.9	34.9	34.0
Manufacturing	36.2	8.15	2.96
Crude Petroleum	3.70	17.4	34.3
Building and Construction	4.68	4.52	1.19
Wholesale and Retail Trade	12.7	16.4	13.9
Communication	0.29	0.12	0.61
Utilities	0.57	0.47	0.40
Transport	3.27	2.67	2.38

Source: Computed from the Central Bank of Nigeria's Statistical Bulletin, 2012

In order to make the business environment more conducive for new investments, the gains from oil revenue were channelled to promote investment in socio-economic infrastructures, especially in the urban areas. The relative attractiveness of the urban centres made many able-bodied Nigerians to migrate from the hinterland, abandoning their farmlands for the cities, thereby compounding urban facilities. This created social problems of congestion, pollution, unemployment and crimes (Nnanna et.al 2003). The national currency, Naira, strengthened as foreign exchange inflows outweighed outflows, and foreign reserves built up. Up until 1985, the Naira was stronger than the US Dollar, as shown in Table 2.2. This encouraged import-oriented consumption habit among Nigerians. Nigeria became a perennial net importer of goods and services. This became a major problem when oil earnings decreased with lower international oil prices. External reserves collapsed, fiscal deficits mounted and external borrowing escalated. Most of Nigeria's macro-economic indices became unstable and worrisome.

Table 2.2: Average Exchange Rates in Nigeria, 1970-2011

Year	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-2004	2005-2009	2010-2011
₦/$	0.671	0.618	0.664	3.772	15.837	84.015	121.034	125.866	141.293
₦/£	1.633	1.229	1.177	6.101	25.657	137.472	196.816	246.011	265.515

Source: Computed from the Central Bank of Nigeria' Statistical Bulletin, 2012.

Note: ₦/$ Exchange rate of Naira to US Dollar, ₦/£ Exchange rate of British Pound Sterling to Naira.

Several policy measures were adopted to address the defective structures and inefficiencies in the oil sector. However, implementation became problematic. These created macroeconomic distortions and weakened the inchoate institutions for policy implementation. The average Nigerians therefore, became so sensitive to petroleum oil and all the variables surrounding it, to the extent that any development in the international oil markets invites an almost instantaneous reaction from domestic economic agents and policy makers. Policy formulation responds to the oil situation and attempts to take advantage of it. This usually takes the form of "*expand expenditure when oil earnings increase, maintain the position when there is a dip in earnings and seek a desperate way out when there is crisis*" (Adedipe 2004).

Several works have been done on the structure of the Nigerian economy[8]. Most studies focused more on assessment of the impact of reform programmes on macro-economic stability. Studies conducted by the Central Bank of Nigeria (CBN 2000) puts most of the structural issues in perspective, with supportive data as evidence. The highlights of the structure of the Nigerian economy and changes therein are summarized as follows:

(i) Agriculture dominated the Gross Domestic Product (GDP) components, but its contribution has reduced gradually over the years since the attainment of political independence in 1960. This ratio dropped from 55.9% in 1960-1970 to 34.9% and 34.0% in 1980-1990 and 2010-2011 respectively, as detailed in Table 2.1.

(ii) Manufacturing improved in the early post-independence years, but its contribution sharply declined from 8.15% to 2.96% during 1980-1990 and 2000-2011 respectively.

(iii) Crude petroleum share in the GDP rose from 3.7% to 17.4% and 34.3% during 1960-1970, 1980-1990 and 2000-2011 as shown in Table 2.1.

(iv) Wholesale and retail trade contributions to GDP recorded a marginal increase from 12.7% to 16.4% during 1960-1970 and 1980-1990. It later declined to 13.9% in 2000-2011. During the same period, Building and Construction, Utilities and Transport sectors recorded decreasing contributions to the GDP. Communication sector share in GDP recorded a sharp increase from 0.29% to 0.61% during 1960-1970 and 2000-2011 respectively (Table 2.1). External trade was dominated by oil. Table 2.3 clearly explained the trend in percentages.

[8]. Of much interest are studies by Ajakaiye 2001, Nnanna 2003 and Adedipe 2004.Each of these studies have gaps of limited sectoral coverage (some ignored social services like education and health), scope (some dealt with only the effects of reforms on the structure) or the data relied upon for the analysis were outdated.

Table 2.3 : Nigeria : Average Visible Trade (%), 1970-2011

Sector	1970- 1980	1990-2000	2002-2007	2008 - 2011
Oil	46.2	72.5	69.7	78.6
Non- Oil	53.8	27.5	30.7	21.4

Source: Computed from the Central Bank of Nigeria's Statistical Bulletin, 2012

In 1978, there was a downturn in oil earnings as crude oil prices dropped in the international markets and the first major economic policy, labelled "belt tightening", was introduced by Obasanjo's military government. Following closely in 1979, Nigeria resorted to the international capital markets to raise $2.38 million external loans to fund development projects. There were three major economic policies in the 1980s, namely:

(i) The recommendations of the Onosode Commission on pay structure in Government parastatals were adopted in 1981 which suggested upward review of salaries and benefits of public officers.

(ii) The Economic Stabilization Act of 1982 was implemented to address the dwindling oil earnings and major external sector imbalances.

(iii) The Structural Adjustment Programme (SAP) was implemented in Nigeria between 1986 and 1988. It recorded some significant gains in the first two years of implementation, but suffered a setback when certain aspects of the programme contents were reversed.

2.3 Business Environment

Nigeria's business environment[9] offers investors with abundant natural resources, a low cost labour pool and a potentially large domestic market. However, much of the market potentials are unrealised, and the legacy of military rule combined with the oil boom created a dysfunctional business environment. The oil boom of the 70's spurred corruption and other rent-seeking activities in the economy. Various surveys reports indicated that corruption constituted one of the major problem dragging backward Nigeria's growth potentials. Between 1960 and 1999, a total of $380 billion was lost to corruption (Human Rights Watch 2007). Nigeria operates a federal system of government with thirty-six (36) federating states. It has three layers of government: Federal, State and Local, and many governmental structures overlapping. With this structure, multiple complex regulations exists in all the three layers of government.

The Nigerian business environment is highly segmented into; oil related industries, public sector and parastatals, organized private sector and informal sector. Companies outside oil-related industries are frequent targets of corruption. The Small and Medium Scale Enterprises

[9]. For further discussion on business environment in Nigeria, see www.business-anti-corruption.com.

in the formal private sector experience difficulties in transacting business. Corruption has been reported as an impediment to ease of doing business in Nigeria. The manufacturing sector contributed infinitesimally to output; the informal sector remains the main source of income and employment. Widespread corruption has made unproductive activities such as the provision of intermediary services lucrative, encouraging companies to live on patronage. The state level of governance was reported to be more corrupt than the federal level and has direct control of many areas important to businesses. The states agencies tend to impose a wide range of fees, licenses, fines and taxes arbitrarily (The World Bank & IFC; Doing Business 2008).

Corruption was identified as the third most important obstacle to doing business in Nigeria in the 2007-2008 (Global Competitiveness Report 2008). Apart from corruption, difficulties in accessing formal credit from the banking system, high crime rate and the inconsistent public regulations were cited as obstacles to formal business. Business in Nigeria was also affected by e-mail based "Advance Fee Frauds" committed by Nigerians. In order to limit the possibility of corruption, companies can only do business with cash not exceeding ₦500,000. Any international transfer of cash by companies should not exceed $10,000 and all transactions must go through the Central Bank of Nigeria or the Security and Exchange Commission. The policy of cash limit was introduced in 2008.

2.4 Regulatory Environment

Regulatory framework for corrupt practices in Nigeria can be explained within the context of interlaced network of functions among the three layers of government, namely the executives, legislatives and judiciary. The powers of the three institutions are well spelt out in the constitution[10]. The constitution accorded the legislatives powers to investigate and expose corrupt practices in Nigeria. It is instructive to note that the regulatory environment has to grapple with varieties of corruption cases by enacting legislation to prosecute culprits and to prevent corruption. The legislature's power to investigate and expose corruption and other related offences are not absolute. Legislatures are not empowered to punish following the result of investigation. The prosecution of any person found guilty of corrupt practices is left to the executives. The judiciary compliments the position of the legislature in checking

[10]. Nigeria's 1999 constitution contains several provisions geared towards good governance, supported by legislations by the parliament and judicial validation in vigorous pursuit of addressing public corruption in Nigeria.

corruption. There are two anti-corruption commissions set up to combat corruption in Nigeria. These include:

(i) Independent Corrupt Practices and Other Related Offences Act 2000.

(ii) Economic and Financial Crime Commission Act 2004 (EFCC).

The EFCC Act empowers the commission to investigate, prevent and prosecute offenders who engage in: *Money laundering, embezzlement, bribery, looting and any form of corrupt practices, illegal arms deal, smuggling, human trafficking and child labour, illegal oil bunkering, illegal mining, tax evasion, foreign exchange malpractices including counterfeiting of currency, theft of intellectual property and piracy, open market abuse, dumping of toxic, waste, and prohibited goods*[11].

2.5 An Overview of Recorded Cases of Corruption in Nigeria

Corruption has been documented as one of the problems militating against Nigeria's economic, political and social stability. It ranged from petty corruption to political or systemic corruption (International Centre for Economic Growth 1999). World Bank studies put corruption at over $1 trillion per year accounting for about 12% of the Gross Domestic Product of nations like Nigeria, Kenya and Venezuela (Nwabuzor 2005). There is a wide support in the literature for the view that corruption is detrimental to growth and development (Tanzi 2002; Svensson 2005; Gyimah-Brempong 2002). Cases of corruption had become so disturbing that the Germany-based non-governmental organization, Transparency International (TI) took it upon itself to carry out annual survey of corrupt countries all over the world. Of the 54 countries surveyed in 1996 and 52 countries in 1997, Nigeria was perceived as the most corrupt in two successive years. In the 1996 survey, Nigeria was followed by Pakistan and Kenya. Cameroon was the third African country in the top ten most corrupt lists. The country with the least perceived corruption was New Zealand. Denmark was rated second and Sweden came third; there was no African country in the top twenty least corrupt nations list. The Transparency Organization ranked Nigeria as the second most corrupt nation in the world in its 1999, 2001, 2002 and 2003 surveys. Nigeria was ranked among the most corrupt nation in the World in TI's survey of 2000. Survey of 2004 was carried on 146 countries, and Nigeria was ranked third most corrupt nation in the world. The organization's surveys of 2006 and 2007 carried

[11]. Section 6(a) – (q) and 7 of Economic and Financial Crime Commission Act 2004.

out on 163 and 180 countries respectively ranked Nigeria as seventeenth and thirty-third most corrupt nations in the world (TI 2006, 2007). Nigeria has not been exonerated from the list of the top leading countries on corruption index. Table 2.4 below summarized Nigeria's ranking for the fourteen-year period (1998-2011).

Table 2.4:Fourteen-Year Ranks of Nigeria on Transparency International's Corruption Perception Index (1998-2011)

Year*	CPI**	Rank***	Position from Bottom****
1998	1.2	81/85	5th
1999	1.6	98/99	2nd
2000	1.2	90/90	1st
2001	1.0	90/91	2nd
2002	1.6	101/102	2nd
2003	1.6	132/133	2nd
2004	1.6	144/146	3rd
2005	1.9	152/168	6th
2006	2.2	142/163	22nd
2007	2.2	147/179	33rd
2008	2.7	121/180	60th
2009	2.5	130/180	51st
2010	2.4	134/178	45th
2011	2.5	143/182	39th

Source: Transparency International. www.transparencyinternational.org

Notes: *Year of report. Data refers to the previous year during which the survey was conducted; ** CPI = corruption perception index; its value is between 0 (extreme corruption) and 10 (no corruption at all); *** Countries are ranked by their CPI scores. The numerator is the rank of Nigeria and the denominator is the number of countries surveyed. For instance, 81/85 means that Nigeria was ranked at the 81st position out of 85 countries surveyed in 1997 (i.e. the year before 1998). In other words, Nigeria was ranked the 5th most corrupt country in 1997; **** A lower position indicates worsening corruption while a higher position indicates improvement (reduced corruption) relative to other countries.

The above corruption picture on Nigeria based on Transparency International scores and ranking fundamentally classified Nigeria as an underdeveloped country. Corruption in public life manifested in 1957 when the first panel of inquiry was set up to look into African Continental Bank (ACB) and Nnamdi Azikiwe affairs[12]. In 1962, Coker commission was set up to investigate the relationship between Obafemi Awolowo government and the National Investment and Property Company[13]. In 1967, another commission of enquiry was constituted to investigate assets of fifteen public officers in the defunct Mid-Western region (see Nwaobi 2006 and Olopoenia 1998). Corruption was kept at manageable levels during the First Republic[14] [15] in Nigeria as it manifested in the form of ethnicity, region and religion. However, cases of corruption during the period were clouded by political infighting. Based on the growing tide of corruption in the country, the military strucked and took over power from the civilian. All coups in Nigeria were premised on stamping out corruption.

During the oil boom period in the seventies, Nigeria made headlines with her endowed oil and natural gas resources capable of financing a number of important projects to meet basic consumption and development needs. However, these resources are not channelled to the areas that are useful for the growth of the economy. The succession of dictatorial regimes, disregard of human rights, political instability and economic mismanagement have all contributed to cast Nigeria in a bad light internationally. These factors have also served to undermine Nigeria's economic growth and development potential, in terms of global development indicators. With a per capita income of $1,149 in 2000, Nigeria ranked amongst the least developed countries in the World Bank league tables (Salisu 2000).

The discovery of oil has been a blessing and a curse to Nigeria. It is a blessing because the oil wealth provided Nigeria with an easy entry into international capital markets. It also allowed the country to embark on large-scale public and private sector projects. The oil revenue have also introduced opportunities for rent seeking activities and corruption in both private and

[12]. Foster-Sutton commission was set up in the Eastern Nigeria in 1957 to investigate the charges leveled against Nnamdi Azikiwe and ACB.

[13]. National Investment and Property was indebted to the western region government to the tune of £7,200.

[14].The level of corruption in the first republic served as the basis of character description in the Achebe's book "No longer at Ease".

[15] .The sophistication of corruption described in the Achebe's book "A man of the people" was similar to that of the first republic.

public sectors of the economy. For most part of Gowon's administration[16], corruption was kept away from public view until 1975 when a corruption scandal surrounding the importation of cement came up. Many officials of the defence ministry and the Central Bank of Nigeria were involved in the scandal. Officials were accused of falsifying ships manifest and inflating the amount of cement to be purchased. The administration of Muritala Mohammed made a reformist changes in the Nigerian economy by sacking large number of government officials and civil servants. Corruption was deemed pervasive during the administration of Shehu Shagari[17]. In 1985, Buhari government charged and convicted some public office holders for corrupt practices. The death of Sani Abacha revealed the global nature of graft. French investigation of bribes paid to government officials to ease the award of a gas plant construction in Nigeria revealed the global level of official graft in Nigeria. The investigation led to the freezing of accounts containing about $100 million[18]. The problem of Corruption in Nigeria lies at the intersection of the public and private sectors[19], as rightly observed by Uwais (Chief Justice of Nigeria)[20] that, corruption is not a disease which afflicted public officers alone but society as a whole. The Nigeria Corruption Index (NCI) 2007 have identified some key organizations found to be corrupt based on the survey carried out. The level of corruption was measured by percentage scores. Table 2.5 showed that the Police Force ranked higher on the list with a score of 96 percent; followed by the Power Holding Company with 83 percent. The Ministry of Education was next to the Power Holding Company with a score of 65 percent, followed by Customs and Excise duties department having 63 percent. Federal Road Safety, Immigration and Passport; Jamb; and Local Government Authorities had 42, 56, 41, 47 percent respectively. Other sectors included in the lists are: Tax offices, Ministry of Health; Ministry of Justice and the Presidency with percentage scores of 36, 30, 22, and 24 respectively. The table revealed that all sectors in Nigeria are corrupt.

[16]. See for example. Turner. the Nigerian cement racket, Africa Guide, 1976.
[17]. Muritala Mohammed was a military ruler of Nigeria (1975-1976). He was assassinated in a military coup on 13th February, 1976.
[18]. See Igbik,Owubo, H (2004).
[19]. See T.A Oyeyipo(2006).
[20]. Attorney-General of Ondo State vs Attorney- General of the federation (2002) FWLR (pt iii) at 2070-2071.

Table 2.5 : Top Corrupt Organizations in Nigeria

Organization	Year 2005 (%)	Year 2007 (%)
The Police	96	99
Power Holding Company Nigeria (PHCN)	83	87
Ministry of Education (University/Polytechnic/ College of Education	63	74
Custom and Excise Department	65	61
Federal Road Safety Corp. (FRSC)	42	51
Immigration/ Passport Office	56	48
Joint Admissions and Matriculation Board	41	47
Local Government Authorities	47	46
Independent National Electoral Commission (INEC)	-	38
Tax Official /Federal Inland Revenue Service (FIRES)	36	36
Health Ministry/ Primary Health/ Teaching Hospital	30	32
Ministry of Justice	27	31
The Presidency	24	29
Nigeria National Petroleum Commission (NNPC)	27	28
Federal Housing Authority	26	28
Nigeria Ports Authority/ Nigeria Maritime Authority	33	24

Source: Nigeria Corruption Index (2007), CLEEN Foundation

Another area in which corruption has manifested itself in Nigeria is in the area of project execution. For instance, Ajaokuta, a steel mill in Nigeria, has been under construction since 1979 and throughout that period of time has consumed over $7b. It has produced no steel. Another abandoned project was Alscon Upper Block (an aluminium plant in Nigeria) which has consumed $3b, but has not produced any aluminium (Obayelu 2007).

The causes of corruption are myriads and they have political and cultural variables. Some evidence points to a link between corruption and social diversity, ethno-linguistic fractionalization, and the proportions of country's population adhering to different belief system (Lipset and Lenz 2000). A number of factors have been identified as instrumental to enthroning corrupt practices in Nigeria. These include the nature of Nigeria's political economy, the weak institutions of government, and a dysfunctional legal system. Absence of clear rules and codes of ethics leads to abuse of discretionary power make most Nigerian vulnerable to corrupt practices. Nigeria has a culture of affluent and ostentatious living that expects much from "big men", extended family pressures, village/ethnic loyalties, and competitive ethnicity. Low civil service salaries and poor working conditions, with few incentives and rewards for efficient and effective performance, are strong incentives for corruption in Nigeria. Other factors include less effective government works with slow budget procedures, lack of transparency, and weak monitoring mechanism make Nigeria a fertile environment for corrupt practice (Maduagwe 1996).

CHAPTER THREE

REVIEW OF LITERATURE

3.1 Introduction

This chapter presents the definitional issues and typologies of corruption in Nigeria. It also analyzed several approaches that have been used to model corruption both in developed and less developed countries. The theoretical, methodological, and empirical literature on corruption-growth nexus is quite vast and extensive. This chapter also provides insightful and copious review of the concept, methodology, and empirical issues on corruption. The chapter concluded by analyzing the causes, indicators and measurement issues surrounding corruption both in developed and less developed countries.

3.2 Definitional Issues and Typology of Corruption

3.2.1 Concept of Corruption

The literature on corruption and its effect on economic growth is quite extensive and there is hardly any agreement amongst researchers on acceptable definition of corruption. Many scholars have attempted to conceptualized corruption[21]. The Oxford Advanced Learner's Dictionary (2000, p. 281) described corruption as:

(1) dishonest or illegal behaviour, especially of people in authority;

(2) the act or effect of making somebody change from moral to immoral standards of behaviour. From the two classifications, corruption is linked to two important elements: authority and morality. In a broader sense, corruption can be defined as "an arrangement that involves an exchange between two parties[22], the demander and the supplier. Corruption is like a transaction where, there is demand by the briber (to get a benefit) and supply by the bribee (public officer, who has the power to sell the benefit). A price (bribe) occurs which is in proportion to the benefit obtained by the briber and compensates the officer for the risks and the effort involved (Macrae 1982). This definition distinguishes the factors that influence the demand price and supply price of "favour". The World Bank (2001) conceptualized corruption as an abuse of public office for private gains. Public office is abused through rent seeking activities for private gain when an official accepts, solicits, or extorts a bribe. Public office is

[21]. See for example the works of Chakrabarti 2000; Mauro 1997, 1998 ; Salisu, 2000; Tanzi and Davoodi 2002, Olopoenia 1998: Obayelu 2007, Okafor 2007 among others. the most commonly used definition is that of the World Bank.

[22]. If the two parties involved in a corrupt transaction obey secrecy with care, It would be difficult for the law enforcement authority to uncover corrupt practice.

also abused when private agents actively offer bribes to circumvent public policies and processes for competitive advantage and profit. Public office can also be abused for personal benefit even if no bribery occurs, through patronage and nepotism, the theft of state assets or the diversion of state resources (World Bank 1997). Gould (1991) explicitly defined corruption as a moral problem, that is, it is \an immoral and unethical phenomenon that contains a set of moral aberrations from moral standards of society, causing loss of respect for and confidence in duly constituted authority. This definition is in line with Dobel (1978) who labelled corruption as \the moral incapacity to make disinterested moral commitments to actions, symbols, and institutions which benefit the substantive common welfare.

These normative definitions, however, are not without problems. Moral norms differ from place to place and change from time to time. For example, whose moral standard should be used, or what is the appropriate moral benchmark if there is more than one standard? In African traditions 'gift giving' is a common practice (de Sardan 1999), but in Western cultures it is often regarded as corruption (Qizilbash 2001). Also, what was not regarded in the past as corrupt acts, now may be labelled as corruption, and the other way around. Moreover, viewing corruption merely as a moral problem tends to individualize this social phenomenon and ignores the wider socio-political context of corruption. For corruption to exist, according to Jain (2001), three conditions should be fulfilled: discretionary power, economic rents, and a weak judicial system. Discretionary power relates to authority to design and administer regulations, which, in turn, is accompanied by the presence of extracted rents associated with power. A weak judicial system implies a low probability of detection and lack of sanctions. Empirical research that sheds some light on the validity of these elements is scarce and neither establishes that these three elements fully describe corruption nor provides an estimate of their relative importance.

Corruption can also be explained within the context of a principal–agent problem. There is usually a delegation of authority by the principal to the agent; discretion is given to the agent to act in name of the principal. Corruption occurs when this discretion is used for “private benefit” by the agent to the detriment of the principal. The difficulty of detection or lack of accountability completes the transaction. In all the definitions, “private benefit” is emphasized and the illegality of the ways of obtaining it is the main characteristic of corruption. Corruption literature has close connection with rent seeking literature. The main motivation behind both is

the same: redistribute for private gain rather than produce. However, the two are not the same. Property owners have the incentive to influence decisions of those in power and sometimes influence of these interest groups may lead to correct decisions both from the point of view of principal and agent, so influence process may not involve corruption. Corruption arises when there are resources that can be easily appropriated or transferred by public officers with high degree of discretionary powers in allocating them. In markets characterized by some form of imperfect competition, there are rents to be appropriated, which signifies a necessary condition for the emergence of corruption. The second condition for corruption to arise is the presence of individuals with discretionary power over market outcomes, especially if these individuals are imperfectly accountable for their decisions. This definition suggests that corruption is mainly associated with the activities of the public sector. Chakrabarti (2000) affirmed that corruption at the societal level is the outcome of individual choice of corruption levels and that choice is rooted in the risk-return trade off faced by an individual. The risk and return of corruption activity to the individual agents depend on the overall corruption level. The more widespread corruption is, the lower is its risk and rewards.

3.2.2 Typology of Corruption

Attempts have been made by scholars to divide corruption into classes. Alatas (1990) classified corruption into seven (7) categories: autogenic, defensive, extortive, investive, nepotistic, supportive and transactive. *Autogenic corruption* is self-generating and typically involves only the perpetrator. *Defensive corruption* involves situations where a person needing a critical service is compelled to bribe in order to prevent unpleasant consequences. *Extortive corruption* entails the behaviour of a person demanding personal compensation in exchange for services. *Investive corruption* entails the offer of goods or services without a direct link to any particular favour at the present, but in anticipation of future situations when the favour may be required. *Nepotistic corruption* refers to the preferential treatment of, or unjustified appointment of friends or relations to public office, in violation of the accepted guidelines. *Supportive corruption* usually does not involve money or immediate gains, but involves actions taken to protect or strengthen the existing corruption. *Transactive corruption* refers to situations where the two parties are mutual and willing participants in the corrupt practice to the advantage of both parties.

Blackburn et al. (2005) described corruption as a clandestine activity, which takes place away from the glare of publicity and therefore is difficult to measure empirically. Rose-Ackerman (1999) has shown that corruption exists when institutions established to regulate the interrelationships between the citizens and the states are used for personal enrichment and provision of benefits to the corrupt and undeserving. Treisman (2000) and Paldam (2003) observed that deficiencies in political system, inappropriate democratic institutions and ineffective judicial system provide a breeding ground for corruption. Owolabi (2007) defines corruption as "the diversion of resources from the betterment of the community to the gain of individuals at the expense of the community". Corruption involves efforts to secure wealth or power through illegal means for private gain at public expense or misuse of public resources for private benefit (Murphy et.al 1991). Ajibola (2006) submitted that corruption is an anti-social behaviour conferring improper benefits contrary to legal and moral norms, which undermine the authorities to improve the living conditions of the people. Erubami and Young (2003) defined corruption as socially impermissible deviance from some public duty or, more generally, some ideal standard of conduct. In this sense, corruption denote the use of public resources for the achievement of personal ends (Aluko 2006).

The International Monetary Fund (2000) conceptualized corruption as "abuse of authority or trust for private benefit: and is a temptation indulged in not only by public officials but also by those in positions of trust or authority in private enterprises or non-profit organizations". Corruption entails a wide range of conduct of misconduct ranging from massive fraud, extortion, bribery, embezzlement, nepotism, influence peddling, bestowing of favours to friends, rigging of elections, abuse of public property, sale of fake or expired drugs. Corruption frequently takes place in societies where there is considerable systemic failure in terms of accountability and transparency in both the public and private sector (Doig and Riley, 2000). Some studies have taken a holistic (broader) approach in the discussion of corruption by dividing it into many forms and sub-divisions. These are: (i) Political Corruption (*grand*), (ii) Bureaucratic Corruption (*petty),* (iii) Electoral Corruption.

Political corruption takes place at the highest levels of political authority. It occurs when the political office holders and decision-makers who were saddled with the responsibility of formulating and implementing policies guiding the people are themselves corrupt. It also takes place when policy formulation and legislation is tailored to benefit politicians and legislators.

Political corruption is sometimes seen as similar to corruption of greed as it affects the manner in which decisions are made, as it manipulates political institutions, rules of procedure, and distorts the institutions of government (*The Encyclopaedia Americana, 1999*).

Bureaucratic corruption occurs in the public administration or the implementation end of politics. This kind of corruption is branded low and street level corruption. It is the kind of corruption the citizens encounter daily at places like the hospitals, schools, local licensing offices, police check points, taxing offices, customs check-points and so on. Bureaucratic petty corruption is similar to corruption of need.

Electoral corruption includes purchase of votes with money, promises of office or special favours, coercion, intimidation, and interference with freedom of election (For example, Nigeria is a good example where this practice is common). Votes are bought, people are killed or maimed in the name of election, losers end up as the winners in elections, and votes turn up in areas where votes were not cast). Electoral corruption involves sales of legislative votes, administrative, or judicial decision, or governmental appointment (*The Encyclopaedia Americana, 1999*). Other forms of corruption include:

Bribery: The payment that is taken or given in a corrupt relationship. These include kickbacks, gratuities, pay-off, sweeteners, greasing palms, etc.

Fraud: It involves some kind of trickery, swindle and deceit, counterfeiting, racketing, smuggling and forgery.

Embezzlement: This is theft of public resources by public officials. In Nigeria for example, the embezzlement of public funds is one of the most common ways of economic accumulation, perhaps, due to lack of strict regulatory systems.

Extortion: This is money and other resources extracted by the use of coercion, violence or threats to use force.

Favouritism: This is a mechanism of power abuse implying a highly biased distribution of state resource. This is seen as a natural human proclivity to favour friends, family and anybody close and trusted.

Nepotism: This is a special form of favouritism in which an office holder prefers his/her kinfolk and family members. Nepotism, occurs when one is exempted from the application of certain laws or regulations or given undue preference in the allocation of scarce resources (Amundsen 1997; Girling 1997; Fairbanks Jr. 1999).

A corrupt activity must satisfy three criteria: (i) it must have a positive expected economic value to its perpetrators. (ii) it must have some risk of socio-legal censure associated with it and; (iii) it must adversely affect the economy. These criteria were arrived at based on the summary of literatures reviewed on corruption-growth relationship (for example, see Mo 2000; Hodge et al. 2009; Mironov 2005 and Mauro 1997).

3.3 Models of Corruption

Different approaches of modelling corruption have been identified in the literature. These include economic growth (Krueger 1974; Murphy 1993; Mandapaka 1995; Mauro 1995), game theoretic with three players: principal, agent, and hidden principal (Andvig 1990; Laffont 1991; Basu 1992; Mookherjee 1995; Acemoglou 2000), MIMIC (Weck 1983; Frey 1984; Balasa 1985; Giles 1999). In addition, Swarm, as programming language, has been widely used (Turnovsky 1995; Jain 1998; Stapenhurst 1999) to simulate corruption models, and analyze the dynamic and evolutionary process of corruption on various parameters. These models fall short of empirical evidence and lack theories that may assist in putting the various approaches into comparative perspective. Table 3.1 summarized the previous approaches used in modelling corruption:

Table 3.1: Previous Models of Corruption

Approach	Scholars	Models	Methods	Limitations	Findings
Economic Growth It explores the relationship between corruption and economic growth	(Murphy 1993) (Mandapaka 1995) (Triole 1996) (Mauro 1997) (Bardhan 1997) (Hellman 2000)	Lucas type Rent Seeking Keynesian Neoclassical	OLS 2 stage LS	Subjective Surveys Endogeneity bias Sample size sensitivity	Only few were able to empirically prove the negative relationship between corruption and growth.
Game theory It identifies the conditions that are necessary for corruption and those that are conducive to it.	(Andvig 1990) (Laffont 1991) (Basu 1992) (Mookherjee 1995) (Dixit 1997) (Elliot 1997) (Acemoglou 2000)	Principal/Agent Heterogeneous Bureaucrats (Agents)	One stage game	Models the demand side Ignores the government involvement Corruption occurs in continuing relationships	This approach yields some useful insight into the notion of corruption.
Multiple Indicators Multiple Causes It considers observable data on potential indicators to predict values for unobservable (corruption)	(Weck 1983) (Frey 1984) (Balasa 1985) (Salvatore 1991) (Greenaway 1994) (Loayza 1996) (Schneider 1997) (Giles 1999)	LISREL MIMIC	MLE	Co-linearity between indicators Weak estimation techniques Lacks structural interdependence	The output of this model is a time series index that can be used to construct ordinal and cardinal time series of corruption

Simulation It tests the effectiveness of some proposed solutions to combat corruption	(Turnovsky 1995) (Jain 1998) (Stapenhurst 1999) (Hammond 2000) (Luna 2002) (Situngkir 2003)	Agent-based	SWARM STELLA	No way to detect unstable equilibrium Total convergence is not achieved in finite time	Many showed the strength of the cause-effect relationship between corruption and growth.

Source: Farida, M and Ahmadi-Esfahani, F. (2007)."Modelling Corruption in a Cobb-Douglas Production Function Framework" Australian Agricultural and Resource Economics society, 51st Annual Conference 2007.

As indicated in Table 3.1, every approach has strengths and weaknesses. Corruption studies carried out using economic growth approach were able to empirically support the negative relationship between corruption and growth. This may be due to the endogeneity bias which arises as a result of causality among unobserved factors which influenced corruption and growth, subjective bias which came up as a function of evaluation based on personal, poorly measurable, and unverifiable data. Game theoretic approach on corruption study ignores government involvement and emphasized only the demand side of corruption This approach assumes that corruption only occur by chance and in continuous relationships. As for the MIMIC, where the output is a time-series index that can be used to construct ordinal and cardinal time series of corruption, this model lacks structural interdependence in addition to co-linearity between indicators. Finally, simulation models showed the strength of the cause-effect relationship between corruption and growth, but could not detect unstable equilibrium. The economic growth approach has the ability to test the relationship between economic growth and corruption, but its main limitation lies in using the correct index of corruption in the objective function. Most indexes[23] of corruption that have been used in many studies (Mauro 1995; Knack 1995; Murphy 1993; Bardhan, 1997; and Mandapaka 1995) are survey based.

3.4 Corruption and Economic Growth Relationship: The Evidence

This section focuses on the theoretical and empirical studies that have investigated the impact of corruption on economic growth. The World Bank and IMF presumed that corruption has significant negative effects on economic growth. Our careful examination of the existing studies revealed unsettled arguments and mixed results.

3.4.1 Theoretical Studies

Theoretical work on the relationship between corruption and economic performance dates back to the 1960s during which only scanty literature on the enquiry existed. Theoretically, the literature reaches no agreement about the effect of corruption on economic growth. Some researchers suggested that corruption might be desirable and may promote economic growth by enabling individuals to get things done by circumventing bureaucratic delay and red-tape.

[23]. The following are some of the corruption indexes often used in the literature: Corruption perception index (Transparency International), Business Environment and Enterprises Performance Survey and the World Governance Indicators from the World Bank.

Proponents of this view also feel that when bribes act as "*speed vehicle"*, it is likely that bureaucrats would be more helpful when paid directly. From this perspective, corruption acts as a lubricant that smoothened operations and, hence, raises the efficiency of an economy. The 'grease the wheels' hypothesis featured prominently in the early literature on the effects of corruption on growth (e.g., Leff 1964; Leys 1965; Huntington 1968; Acemoglu and Verdier 1998). Beck and Mahler (1986) and Lien (1986) also proposed that corruption increased efficiency in the economy. This occur through the use of "speed money", allowing entrepreneurs to avoid bureaucratic delay by paying bribes. Nye (1967) argues that corruption might be a way to overcome discrimination against members of a minority group, which could actually prevent entrepreneurs from accessing markets. This is because inefficient regulations constitutes an impediment to investment that can be overcome by bribing bureaucrats.

Bardhan (1997) classified the literature into a number of thematic areas, including: (i) the static effects of corruption on efficiency; (ii) the types of corruption (centralized versus decentralized) and their differential impacts on efficiency; (iii) differences in levels and persistence of corruption; (iv) corruption and growth; and (v) policy options for tackling corruption. This review is very useful for identifying the theoretical/analytical issues in the study of corruption – and for understanding the dynamics that may explain the level, persistence and variation of corruption across countries and over time. Since the mid 1980s, some economists have formalized mechanisms, in which corruption enhances efficiency and promotes growth. A "queue model" proposed by Lui (1985) emphasized that bureaucrats, when allocating business licenses to firms, give priority to those who evaluate time at the greatest value and bribe the bureaucrats into speeding up procedures.

Beck and Maher (1986) and Lien (1986) developed "auction models" arguing that bribes in a bidding process can promote efficiency because most efficient firms are often those who can afford the highest bribe. Shleifer and Vishny (1994) modelled a bargaining process between public and private sectors, eventually echoing Leff's (1964) proposition by arguing that corruption "enables private agents to buy their way out of politically imposed inefficiencies". Some scholars, such as Tanzi (1998) and Aidt (2003), have recently refuted these arguments for various reasons. First, private firms paying a high bribe are not necessarily economically competitive firms. If a firm with potentially talented individuals engages in rent-seeking activities instead of more productive activities, such a sub-optimal use of human capital will

damage macroeconomic growth (Baumol 1990; Lui 1996 and Murphy et al. 1991). However, private firms are often forced to make side-payments to government officials to run their business in many countries, such as Indonesia (Sjaifudian 1997), Russia (Shleifer 1996) and Ukraine (Kaufmann 1997), and the cost of transacting such activities is particularly high for small but emerging enterprises, which can be a driving force of economic growth. Second, corruption acts as an arbitrary tax for those giving bribes to public officials, as they have to bear the cost of searching for "partners" and negotiating with them. Because of such rent-seeking costs, Aidt (2003) argues, the auction model's claim that bribery is equivalent to competitive auction is invalid. Furthermore, when corrupt officials rather than the treasury collect revenues from individuals and firms, an opportunity to lower the tax burden is lost (Goulder et al. 1997). Finally, government officials intentionally impose rigidities in order to extract bribes, thus officials know that the more rigidities they impose the more opportunity they have for extracting bribes. Similarly, if bribes are used to speed up procedures, bureaucrats may further slow down the administrative procedures (Andvig 1991; Myrdal 1968). In short, when corruption allows public officials to receive private benefits secretly and arbitrarily, they do not perform their expected role of fixing market failures, and instead create even more market failures. The government's fundamental role of protecting property rights is also distorted, and its accountability and transparency are diminished (Boycko et al. 1996; Farrell 1987).

The theoretical literature analyzed the determinants of corruption from the 'winner's' point of view. Alam (1995) developed a theoretical model that incorporates the loser's perspective in the analysis of causes of corruption. The theoretical work on the causes of corruption from the winner's perspective has identified several factors. These factors encompasses measures of government interventions, or government regulations, public sector wages, system of recruitment and promotion, and size of the bureaucracy. Most of the government interventions are related to regulations involving licenses and permits, control over public investment contracts such as roads and airports, programs related to the provision of tax incentives, subsidized credit and overvalued foreign exchange, control over hiring and promotions, and control over access to under priced public services, e.g., electricity, telephone and water. Public sector wages, system of recruitment and promotion and size of the bureaucracy determine the willingness of public officials to artificially create regulations that cause corruption.

Bahmani-Oskooee and Goswanmi (2004) explained corruption within the context of the gap between black market exchange rate and the official exchange rate. In many developing countries, because of excess demand for foreign currencies, governments impose controls on trade and capital flows to suppress the demand. Usually, when controls are imposed, central banks also set the exchange rate at an officially fixed level and require all market participants to trade at those fixed rates. Furthermore, they introduce guidelines for allocating their limited amount of foreign exchange. Thus, those in need of foreign exchange whose demands are not satisfied have no choice but to engage in the black (illegal) or parallel (legal) market activity, though at a rate much higher than the official exchange rate set by the government. The percent difference between the black market rate and the official rate constitutes the black market premium.

Cadot (1987) modelled corruption as a gamble for civil servants at every level and finds, among other things that the probability of punishment diminishes with the general level of corruption. Basu et al (1992) have demonstrated how an individual's choice of corruption level differs when he considers the possibility of corruption in the rest of society as compared to that when the choice is made in isolation. Shleifer and Vishny (1993) have shown that the structure of government institutions and of the political process affects corruption levels and the illegality and secrecy associated with corruption exacerbate its distortionary effects. Barreto (2000) develops a neoclassical growth model of endogenous corruption as a result of competition between a public agent and a private agent. A number of studies have recognized that market competition could serve as a possible deterrent to corruption (Rose-Ackerman 1978; Ades and Di Tella 1996). We can explain the argument which says that competition in the market place dampens corruption using the following illustration. In perfect competition, the profits of the firms are zero because each firm operates where price equals marginal cost (P = MC). The firms have no incentives to offer bribes for protection because the additional profit due to protection will be dissipated among new firms, which enter the market. On the other hand, if a firm is enjoying monopoly power and reaping abnormal profits, the firm has incentives to keep this monopoly power intact and thus, offer bribes to protect its monopoly.

Blackburn, Bose, and Haque (2005) derived a theoretical relationship between corruption, economic development, and a number of other variables, using a dynamic general equilibrium

model of economic growth. Their model indicated that the relationship between corruption and economic development is both negative and two ways causal. Shleifer and Vishny (1993) developed a principal-agent model of corruption. In this model, the government is the principal and the bureaucrats are agents. The bureaucrats acting in their self-interest would sometimes extort bribes at the expense of serving the government's interests. This model predicts that corruption decreases efficiency.

3.4.2 Empirical Studies

The theoretical debate over the effect of corruption on an economy has produced empirical studies aimed at establishing a link between corruption and economic growth. The impact of corruption on economic activity is studied from many different perspectives. Some scholars investigated the impact of corruption on economic growth, while others study its impact on domestic and/or foreign direct investment. For example, Mauro (1995) engaged in an empirical analysis of corruption by investigating the relationship between investment and corruption for 58 countries. Corruption variable used in the study was defined as the degree to which business transactions involve corruption and questionable payment. The average ratio of total and private investment to GDP for the period between 1970 and 1985 was drawn from Barro (1991), while the corruption indicator was the simple average for the country in question for the period from 1980 to 1983 from Business International (1984). Mauro finds that corruption has a significant negative effect on the ratio of investment to GDP. These result is consistent with the view that corruption retards economic growth.

The exact channels through which corruption affects economic growth are not resolved empirically. In a follow up study, Mauro (1996) studied the influence of corruption on investment, economic growth, and government expenditure using cross-country data for 101 countries and regression for various time periods. In the earlier work, Mauro found corruption to affect economic growth largely by reducing private investment and possibly by altering the composition of government expenditure, specifically by lowering the share of spending on education. In a study conducted by Tanzi and Davoodi (1997) on the effect of corruption on public expenditure, multiple findings were identified:

(i) Corruption affects significantly on the size of public investment such that the items of the expenditure are easily manipulated by high-level government official to obtain bribe.

(ii) Corruption skews the composition of public expenditure away from needed operations and maintenance towards expenditure on new equipment.

(iii) Corruption reduces the productivity of public investment and that of the country's infrastructure.

(iv) Corruption has the tendency to reduce tax revenue because it compromises the government's ability to collect taxes and tariffs.

Rahman et al (1999) investigated the impact of corruption on economic growth and Gross Domestic Investment in Bangladesh. The overall result of the study indicated that corruption affects economic growth by reducing Foreign Direct Investments (FDI). Similarly, Mauro (1998) found that corruption also affects domestic investments negatively and economic growth is adversely affected. Wei (1998) using data set from fourteen (14) countries found that prevalence of corruption in host countries discourages foreign investment. Wei obtained the coefficients -0.09 and -1.92 for corruption and host country's marginal tax rate. There is a wide support in the literature for the view that corruption is bad for growth (Tanzi 2002; Svensson 2005; Gyimah-Brempong 2002). Empirical evidence showed that countries with higher levels of corruption tend to grow more slowly.

In addition to reducing growth, corruption is also found to have distributional effects as it affects the poor disproportionately. This is because corruption slows down the growth of income of the poor, reduces pro-poor public expenditures, causes congestion in social services, and induces capital intensity in production (Ndikumana 2007).

The literature has identified a number of channels, which appears to be empirically more prominent in linking corruption to growth. These include investment, tax revenue, school enrolment, life expectancy, inflation and aid, human capital accumulation, labour productivity, and political instability. Ndikumana (2007) provides a detailed discussion of these channels and their implications for pro-poor growth. In another study Baliamoune-Lutz and Ndikumana (2007) used the Arellano Bond GMM technique to study the impact of corruption on growth using the investment channel. Finding from the study shows that corruption discourages private investment by raising indirect production cost and at the same time increases uncertainty over future returns to capital. Dreher and Herzfeld (2005) test most of the transmission channels identified in the literature using cross-country data over averages of the years 1975-2001 for 71 countries in Africa, Latin America, Eastern Europe and Asia. Their finding shows that only

investments, inflation, aid and public expenditure are significant. Mo (2001) estimated a direct and indirect effect of corruption on economic growth using long-term growth rates of per capita GDP from 1970 to 1985. The study identified three transmission channels namely, investment, human capital and political stability. A regression is run using the corruption perception index of Transparency International, variables measuring the three transmission channels and other control variables. The result indicates that one unit increase in the corruption index reduces the growth rate by about 0.55% point. However, the direct effect of corruption becomes insignificant in both ordinary least squares (OLS) and two-stage least squares (2SLS) estimation after controlling other variables. Mo's study is cross-sectional and it spanned the period 1970 to 1985. Countries used in the study comprised: East Asia, Latin America, OECD and Sub-Saharan Africa. The OLS regressions reveal the sensivity of the estimated technique to the effect of corruption on the growth rate. However, the result suffers from multicollinearity problems as a result of the inclusion of transmission variables in the regression run. The OLS and 2SLS techniques used by Mo (2001) is consistent with Mauro (1995) study which also employed the same technique. A number of studies have also provided evidence showing the linkage between corruption and poverty. For instance, Rose-Ackerman (1997) found that corruption aggravates the problem of poverty through social service channel, infrastructure investment channel and tax channel.

In a study conducted by Gupta et. al. (1998), it was found that corruption widens income inequality and poverty by lowering economic growth, promoting a biased tax system in favour of the rich few, lowering social spending, reducing access to education and reducing the effectiveness of targeting social programs. Treisman (2000) explained how culture, history and institutions of countries affect corruption. A panel study of developing and developed countries was carried out using perceived corruption indices compiled from business risk surveys for a number of years between 1980s and 1990s. Findings from this study shows that countries with a long history of democracy, cultural and institutional tradition of rule of law have significantly lower corruption levels. The degree of democracy was not a significant factor. The conclusion drawn from the study is that more developed and economically more open countries experience less corruption.

Ramey and Ramey (1995) present some empirical evidence to show that there is a negative relationship between macroeconomic volatility and long-term economic growth. They find that

countries with higher volatilities have lower long-term growth rates. Corruption was found to be one of the important reason for the negative correlation between volatility and long-term growth. Standard macroeconomic theories used various economic variables such as aggregate supply or demand shocks, to explain the volatility of business cycle. Some economists have also used other factors, particularly the structure of a country's financial system to explain macroeconomic volatility. Krugman (1998) used a simple static model to show that financial intermediaries whose liabilities are guaranteed by the government pose a serious problem and moral hazard. Pesenti and Roubini (1999) used a dynamic model to show the same result. Easterly, Islam and Stiglitz (2000) argued that the financial structure plays an important role in producing macroeconomic volatility.

Ehrlich and Lui (1999) investigated the relationship between corruption, government size, and economic growth using a panel data, which includes 68 countries over the period 1981-1992. They find that changes in both government size and corruption adversely affect the level of per capita income. Pellegrini and Gerlaugh (2004) estimated the direct and indirect effects of corruption on economic growth using regression analysis. They found that 'one standard deviation increase in the corruption index is associated with a decrease in investments of 2.46% points, which in turn decreases economic growth by 0.34% per year'. The results further showed that, 'a standard deviation increase in the corruption index is associated with a decrease of the openness index by 0.19, resulting in a decrease of economic growth by 0.30% per year. Jointly, the transmission channels explained 81% of the effect of corruption on growth'.

Mendez and Sepulveda (2005) incorporated measures of political freedom as a key determinant of the relationship between corruption and long-run economic growth. Using cross-country data and regressions during the period 1960-2000, they found that the type of political regime is an important determinant of the relationship between corruption and economic growth. By restricting the sample to the countries considered to be free and controlling for a number of economic variables, they found a non-linear relationship between corruption and economic growth. Busse and Hefeker (2006) investigated the links among institutions, political risk, and foreign direct investment inflows using cross-sectional time-series analysis. The sample size covers 83 developing countries during the period 1984-2003.

Their findings showed that government stability, internal and external conflict, corruption and ethnic tensions, law and order, democratic accountability of government and quality of bureaucracy are highly significant determinants of foreign investment inflows.

Ali and Isse (2003) examined the determinants of corruption. They investigated the extent to which education, political regimes, ethnicity, judicial efficiency; political freedom and the size of government explained differences in corruption across countries. They suggested that knowledge of the determinants of corruption would help authorities to design and implement measures to curb and control its human effects. Abed and Davoodi (2002) examined the impact of corruption in transition economies using a panel and cross sectional data for twenty-five (25) countries over the period of 1994-1998. The results show that higher economic growth is associated with lower corruption in both panel and cross-sectional regressions and it shows significance at 1% level. In addition, Rock and Bonnett (2004) observed that corruption reduced economic growth, slows investment efficiency in most developing countries, particularly small developing countries, but increases growth in large East Asian newly industrializing economies. Several reasons have been advanced for this observation. First, large countries have relatively large internal markets and similarly large supplies of labour. This enables governments in large developing countries to focus on import substitution (ISI) policies than in smaller developing countries. This may help them fend off pressures from international institutions and foreign investors to curb corruption, particularly the kind of corruption associated with selective industrial policies and money politics. Second, a large internal market and a large pool of labour may also mean that foreign investors are more likely to accept corruption as a way of doing business, if doing so enables them to gain unrestricted access to local goods and labour markets. Neither of these advantages is available to small developing countries. Their small market size means that they reach the limits of ISI fairly quickly and this should push, at least the development-oriented governments in small developing countries, to be more open to aid, trade and investment. By itself, this should expose small countries to more pressure to conform to emerging international norms regarding governance and corruption. Similarly, small domestic markets and small pools of labour may mean that foreign investors are likely to be less understanding of local corrupt business practices. This combination may explain why governments in several prominent small developing economies with low levels of corruption – Singapore, Hong Kong, Chile, Botswana

and Malaysia – have such high growth rates and why some large countries – China, India, Brazil, and Mexico – with relatively high levels of corruption have such differing growth rates. Rock and Bonnett's results have shown that corruption tends to be growth-enhancing in the large East Asian newly industrializing countries where governments with long time horizons have centralized corruption networks with their big business partners.

Aliyu (2007) using distributed lag model in a study on democracy, corruption and economic development in Nigeria found strong evidence suggesting that democratic regime promotes economic growth and development. The study could not find strong evidence suggesting positive or adverse relationship between corruption and development in the sample. Most recently, the corruption-growth literature has started to focus on regional levels of analysis. The works of Guetat (2006), Gyimah-Brempong and Camacho (2006) are obvious example[24]. More specifically, Guetat (2006) attempted to separate the impact of corruption in MENA (Middle Eastern-North America) countries from other countries including Latin American, Asian and Sub-Saharan Africa by estimating an economic growth model for a sample of 90 countries for the period 1960-2000. Guetat introduced regional dummy variables and used interaction terms between the variables in regression and the regional dummies to distinguish among the regional-specific effects. The results indicated that corruption deters growth more significantly in MENA countries than Latin American and other countries.

Gyimah-Brempong and Camacho (2006) employed panel data from 61 countries for the period 1980-1998 to examine regional differences on the impact of corruption on economic growth and income inequality in Africa, Asia and Latin America. Regional dummy variables were created and interaction terms between them were also established in the regression run. Overall, they found a negative impact of corruption on the growth of income per capita and the distribution of income. Rijckeghem and Weder (2001) in their panel data analysis of 31 developing countries over the period 1982–94 finds a statistically significant negative relationship between corruption (measured using survey data of International Country Risk Guide) and the ratio of government wage level to manufacturing sector wage level. In the short run, higher wage level may not necessarily lower corruption. In the long run, the effect of wage policy on corruption may occur with lag due to social and political inertia.

[24]. These studies include regions specific institutional variables, such as bureaucratic quality and corruption into cross-regression to distinguish the impact of these variables on economic growth at regional level.

It is clear from the earlier studies in the extant literature that there is no consensus relative to the effect of corruption on economic growth. There are claims on both sides of the aisle regarding the usefulness or harmfulness of corruption. Studies, which claim that corruption is harmful to economic growth, tend to focus attention on the implications of corruption for efficiency. Other studies advocate that corruption greases the wheels of business and commerce and thus, facilitates economic growth and investment. Only a handful of studies including Gyimah-Brempong (2002), Aliyu and Oludele (2008) and Tanzi and Davoodi (1997) have examined this issue for Africa. African countries have not received adequate attention on this subject even though most of the corrupt nations in the world are located in the continent.

Systematic empirical analysis of the causes of corruption first emerged during the late 1980s and early 1990s. Mauro (1995) examined the impact of corruption on growth using the Business International's Corruption Index and growth rates of per capita GDP from 1960 to 1985[25]. Goel and Rich (1989), using United States data, regressed corruption variable (measured by the government employees who are convicted of bribery) on policing activities (measured by real police expenditure per government employee), probability of being convicted (measured by the ratio of convictions to indictments in each year), severity of punishment (measured by average prison term of embezzlement), relative incomes of government employees (obtained by subtracting government employee earnings from alternative earnings), unemployment (to account for implicit costs) and total real annual advertising expenses (to account for demonstration effects). Results of regression analysis showed that the coefficient of probability of being convicted and severity of punishment are negative as expected, implying that greater probability of being convicted and higher prison terms discourage bribe taking. The policing variable has no significant effect. Raising salaries have decreasing effect on the level of corruption. Coefficient of unemployment variable is positive and significant, which may reflect a rise in bribe offers during recessions.

There are several other studies, such as those by Wedeman (1997) and Kaufman (1998) that are based on investigative reports. Empirical studies conducted during that period relied heavily on actual data on corruption. Goldsmith (1999) using a sample of 34 low and middle income countries, explores the link between corruption and political variables of economic

[25]. See for example Summers and Heston, 1988.

liberalization, political democratization, administrative centralization and per capita GNP. Using the Transparency International's 1996 Corruption Perceptions Index to measure corruption, the regression results showed that, per capita GNP has a strongly significant decreasing effect on corruption variable; increasing economic liberalization and increasing centralization of the state are also significant factors decreasing corruption. Although less significant than other variables, higher levels of political democratization is also associated with diminished corruption.

Lee (1981) examined the relationship between traditional values and tolerance for corruption in Hong Kong and finds that those of the surveyed people whose traditionality points are higher tolerate corruption more and those with lower traditional bonds, tolerate corruption less. When age and education dimensions are included in the study, it was observed that, those who are comparatively older and less educated are more tolerant to corruption in comparison to the ones who are younger and more educated. Gardiner (1970) and Price (1975) also found negative relationship between educational level and tolerance for corruption, in their survey analysis of USA Wincanton city and Ghana respectively. Ades and Di Tella (1997) in their article, first regressed corruption (using index of World Competitiveness Report for perceived corruption) on per capita GDP, average years of total schooling, extent of political rights in the country (to proxy political competition), security (measuring the extent to which there is general crime prevention), imports as a percentage of GDP (to proxy openness) and industrial policy of the government (which is the main variable of interest, measured with WCR indices of industrial policy, monetary subsidies to private and public enterprises and manufacturing as a percentage of sectoral GDP, in different regressions). A number of panel and cross-section versions of the model's regression analysis are done and results in general show that (all measures of) more active industrial policy is significantly correlated with higher levels of corruption. Degree of political rights in the country has no significant effect on corruption and education level, degree of openness to foreign trade and security level of the country have significantly negative relationships with the level of corruption. Authors then came up with another regression analysis that, total effect of government's industrial policy on investment ranges between 56% and 84% of the direct impact of it when corruption increase that industrial policy caused is accounted for. Laffont and Guessan (1999) examine the relationship between competition and corruption with a game theoretical model and show that the effect of greater

competition on corruption depends on the complementarity or substitutability of the two instruments that can be used to decrease informational rents, namely low powered incentives and greater competition. Authors also empirically test the relationships between competitiveness and corruption using African data. They regressed quality of institutions from the point of view of corruption (using Business International's index for the year 1995) against average annual percentage growth of GDP between 1990–1995, net official development assistance from all donors (as a share of recipient GDP at 1990), ratio of imports in 1995 to GDP in 1990, percentage of population 15 years of age and above that is illiterate (average of 1990 and 1995). Results of the regression showed that openness variable (imports/GDP, which is assumed to show competitiveness) is a strongly significant factor decreasing corruption. Growth rate increase also decreases corruption. Aid and illiteracy rate has a weakly significant increasing effect on corruption. When an interaction variable between the competition and corruption variables is introduced, it is shown that openness variable (imports/GDP)) does not have a uniform sign; it is positive for high levels of corruption but negative for low-levels of it.

With new cross-country data becoming available, researchers have begun to empirically explore the causes and consequences of corruption. On the cause's side, Treisman (2000) finds, among other things, that countries with Protestant traditions, history of British rule, higher level of development and higher level of imports have lower levels of corruption. Rijckeghem and Weder (1997) find negative correlation between civil service wage level and the level of corruption. Leite and Weidmann (1999) find support for their hypothesis that natural resource abundance promotes rent-seeking behaviour or corruption. Nwaobi (2006) used simple growth model to empirically illustrate the interrelationships between natural resources, corruption and economic growth in Nigeria. Finding from the study revealed that countries that are richly endowed with natural resources have high profile of corruption. Nwaobi's study corroborated Leite and Weidmann (1999) results.

The above listing of recent theoretical and empirical research on corruption clearly indicates an obvious lacuna in this area. The theoretical papers deal with the individual's incentives for corruption and possible government action to reduce such incentives at the individual level. The empirical papers deals with country's level data on corruption. The empirical papers typically study corruption at macro level linking the national level of corruption to the

incentives of individual agents in corrupt practices (Chakrabarti 2000). Most empirical works on corruption utilized the corruption perception index[26] to quantitatively assess the degree of corruption in an economy. In sum, the empirical studies however showed mixed results at best. Some may present unbiased estimates, while others may present biased ones.

Methodological problems were also identified in the existing studies. First, any theoretically-driven and practically-relevant study should estimate the long-term effects of corruption. Abed and Davoodi (2002), however, utilized data for the period 1994–98. Using such short term data presents a methodological problem; namely, economic growth in the short-term is influenced by a number of unobserved or immeasurable short-term factors, some of which may be systematic rather than stochastic. Such short-term random and non-random factors can "average out" in the long-run. Second, theoretical models imply that we need to control for the effects of suboptimal government regulation in order to estimate the marginal effects of corruption alone on economic growth. Most studies do not attempt to control this variable. An exception is Abed and Davoodi's (2002) reform index, but it may not be a valid indicator of the government failure. It is typically very difficult, if not impossible, to measure the degree to which government regulation is suboptimal. Third, if this important control variable is immeasurable, or measurable only with serious measurement error, a standard solution is to find an appropriate instrumental variable (or a set of instrumental variables). Rock and Bonnett (2004) and Abed and Davoodi (2002), however, do not attempt to control omitted variable bias using instruments. Other studies do, indeed, run the two-stage least square (2SLS) regressions with instrumental variables, but with the exception of Pellegrini and Gerlagh (2004) do not report the validity of their instruments. Fourth, when estimating the long-term effect of corruption on economic growth, as theoretical studies imply, we should consider the effect of corruption on government failure. Fifth, all existing studies use cross-national data, making it difficult to control for a number of cultural, historical, and institutional differences, including qualitative differences in administrative rules and practices, across observations. However, Aigbokhan (1998) used both cross-sectional and time-series data to analyze the cause and consequences of corruption.

[26]. Virtually all the corruption indices have been criticized on a number of issues. One of the problem arises from the ranking of the indices, and therefore with the difficulty of assigning a meaningful economic interpretations to them. See for example Dreher et al, 2004 for detail analysis.

3.5 Causes and Indicators of Corruption

Based on the theoretical and empirical literature, four main factors were identified as causal variables determining corruption. These include political and judicial factors; historical factors; social and cultural factors; and economic factors.

Political and Judicial factor

The political factors capture the democratic environment of a country, the effectiveness of its judicial system and the origin of its legal system. The role of democracy has been highlighted in several studies of corruption (see Treisman 2000; Paldam 2003). It is widely believed that corruption is related to the deficiencies of the political system and inappropriate democratic system. Political competition tends to enhance transparency and accountability that can provide a check on corruption. The judicial system is also expected to play a role in tracking corruption (Becker 1968). Strong legal foundations and efficient legal systems provide a stable framework for economic activity. Failure of the legal system to provide for the enforcement of contracts undermines the operation of the free market and, in turn, reduces the incentives for agents to participate in productive activities.

Historical Factor

It is difficult to separate the historical factors from the political and judicial factors since the effectiveness of the judicial system is dependent on the colonial heritage of the country in question. Treisman (2000) explored the direct influence of historical tradition on perceived corruption showing that former British colonies or dominions appear to reduce perceived corruption in excess of the role played by the common law system. The most obvious cost of corrupt activities is the risk of getting caught and punished. The probability of getting caught depends in part on the effectiveness of the country's legal system. Two related aspects can be distinguished. First, legal systems differ in the degree of protection and the opportunities for recourse they offer to private property owners harmed by corrupt acts of officials. The common law systems (found mostly in Britain and its former colonies) differ on this dimension from civil law systems (found mostly in continental Europe and its former colonies). Whereas the common law tradition developed first in England to some extent as a defence of parliament and property owners against the attempts by the sovereign to regulate and expropriate them, civil law systems in their Napoleonic, Bismarckian, or other forms developed more as an instrument used by the sovereign for state building and controlling economic life (La Porta et al. 1999).

Common law developed from precedents established by judges, usually allied with the property-owning aristocracy against the Crown, while civil law developed from codes drawn up by jurists at the sovereign's bidding. Second, legal systems differ not just in the formulations and original intent of laws but also in the prevailing expectations and practices that govern how they are enforced. Conceptions of the social role of law and the relative importance of law in preserving social order differ across countries. In Britain and some of its former colonies, scholars have noted an almost obsessive focus on the procedural aspects of law. The British behave like ideologists in regard to rules and like pragmatists in regard to policies. Procedures, to them, are not merely procedures, but sacred rituals. By contrast, in many other cultures social order is associated not so much with adherence to procedures as with respect for hierarchy and the authority of offices. This British preoccupation with procedures has been thought by some to explain why most of the newly independent states with extended democratic experience were former British colonies. A willingness of judges to follow procedures even when the results threaten hierarchy clearly increases the chance that official corruption will be exposed. Thus, one might expect countries with different colonial traditions to have different legal cultures-and different degrees of susceptibility to corruption - irrespective of whether they have common law or civil law systems. Legal system and colonial experience are, of course, highly correlated.

Social and Cultural Factors

This group of factors captures the social and cultural characteristics of a country that may affect upon the pervasiveness of corruption in a given country. For example, religion shapes social attitudes towards social hierarchy and family values and thus may determine the acceptability, or otherwise, of corrupt practices. The role of the religious tradition and corruption has been explored explicitly by Treisman (2000) who finds that a country with a protestant tradition appears to have a negative effect on perceived corruption. Ethnic and linguistic fractionalization of a society may also contribute to the pervasiveness of corruption. The evidence is, however, mixed. Treisman (2000) found no evidence that linguistic fractionalization had a direct impact on corruption, while La Porta et.al. (1999) found evidence that, in societies that were more ethno-linguistically diverse, governments exhibited inferior performance. Alesina et.al (2003) has presented evidence that ethnic and linguistic fractionalization has a statistically significant impact on corruption.

Economic Factors

The economic determinants of corruption across countries have focused typically on three factors: the degree of openness, a country's endowments of natural resources and the size of the public sector. Less open countries restrict trade and impose controls on capital flows. This creates rents and enhances the incentives to engage in corrupt activities. Ades and Di Tella (1999) have shown that increased competition reduces corruption and that economies that are more open are less corrupt. In support of Ades and Di Tella's findings, Treisman (2000) used cross-national data covering 95 countries drawn from: former British dominions and settlement colonies, former Indian colonies and Crown colonies in the study of the causes of corruption. He found that higher imports lower corruption. Exposure to imports may reduce corruption, but corrupt officials are also likely to create rent- generating barriers to trade. Wei and Wu (2001) have presented evidence that countries with capital controls have higher corruption, in turn, receive less foreign investment, and are more prone to financial crises. Years ago, Neeman et. al. (2003) has shown that the effect of corruption on economic growth depends on the openness of the economy.

Natural resource endowments have also featured in cross-country studies of corruption. The justification here is that the concentration of exports on natural resources is a proxy for rent-seeking opportunities. A number of studies have suggested that corruption grows successfully in resource-rich countries than in resource-poor economies (Ades and Di Tella 1999; Sachs and Warner 1995). In Nigeria, for example, oil wealth has been attributed to be one of the main causes of the pervasiveness of rent seeking activities and corruption. The oil boom of the 1970s, in particular, was responsible for the 'Dutch Disease' syndrome in Nigeria; including contraction of agriculture, appreciation of the real exchange rate and a loss of competitiveness of agricultural exports.

Several studies on the causes of corruption have emphasized the size of the public sector. Tanzi (1998), observed that the significant role of the public sector in the economy affords public officials some degree of discretion in the allocation of goods and service provided and hence increases the likelihood of corruption. This mechanism is reinforced if the wages public officials received are relatively low. This issue was explored by Van Rijckeghem and Weder (2001). Their findings showed that low wages of civil servants have a statistically significant

effect on corruption. Table 3.2 provides a summary of the various determinants of corruption, many of which fit the Nigerian situation.

Table 3.2: Factors Influencing Corruption

Factors	Effect/Outcome
1.Wage considerations:	(a) Inadequate pay. (b) Fringe benefits and other financial incentives.
2.Inefficient internal control:	(a)Inadequate supervision and control system. (b)Lack of explicit standard of performance for employees and organizations. (c) Poor recruitment and selection procedures for personnel. (d) Too few or too many (non-transparent) rules and procedures (red tape).
3.Insufficient external control:	(a) Law and order tradition checks and balances. (b) Lack of information made available to the public and freedom of press. (c) Mechanisms for citizens' participation and complaint. (d) Difficulty of providing cases in court. (e) High social acceptance of corruption.
4.Statutory penalty rate :	(a) Amount of fine, prison sentence. (b) Administrative sanctions (c) Prohibition of being ever re-employed in the public sector. (d) Penalties for relatives.
5.Amount of distortions or opportunities in the economy:	(a)Pervasive government regulations (b)High statutory tax rates, non-transparent tax regulations. ©Provision of government services short of demand (government monopolies).
6. Other factors:	(a) Cultural factors. (b) Culture of bureaucratic elitism and education of civil servants. (c) Leadership. (d) Ethnic diversity.

Source: Van Rijckeghem and Weder (1997)

Existing literatures have provided the causal variables to be used as determinants of corruption but less guidance is available on the appropriate indicators. Selecting variables that are correlated with the pervasiveness of corruption across the countries can identify corruption indicator. The most apparent indicator variable is GDP per capita. All available evidence suggests that corruption varies inversely with growth (Mauro 1995 and Paldam 2003). Capital control restrictions is an indicator variable. Countries less open to foreign trade appear to be correlated with high levels of corruption. Wei and Wu (2001), Dreher and Siemers (2003) have noted that countries appearing to exhibit relatively high levels of corruption are likely to impose capital account restrictions.

Recent empirical studies on the consequences of corruption have also focused on the allocation of resources, emphasizing not only the negative impact of corruption on investment but also its negative impact on the composition of investment. Allocation of public procurement contracts through a corrupt system leads to lower public services and diminishes the quality of infrastructure. A close variable that captures the distortion of corruption on the allocation of resources is a measure of financial development. Financial development varies across countries based on the level of development. A good proxy for financial development is given by private credit as a share of GDP.

The final indicator variable centres on investment in projects where the scope for corruption is high and the exact value of the project is difficult to ascertained and measured. It is easy to collect bribes on large infrastructure projects or on military expenditure. As noted by Mauro (1997) lucrative opportunities for corruption typically arise with large projects the exact value of which are difficult to monitor. Rose-Ackerman (1999) provides direct justification for the use of cement consumption as an indicator variable noting that: *"In Nigeria in 1975, the military government ordered cement that totalled two-thirds of the estimated needs of all of Africa and which exceeded the productive capacity of Western Europe and the Soviet Union".*

3.6 Measurement Issues in Corruption: Indicators and Frameworks

The necessary and sufficient condition for the study of corruption is that it must be measured. Exact measures of corruption are difficult to find. It has numerous types and it is unobservable so corruption is measured by proxies. Corruption measurements have increased in numbers, generating a vast array of indicators and sources from diverse institutions, such as international

aid agencies, non-governmental organizations (NGOs), consulting firms and business actors. However, such an increase has not ceased the debate about how effective these measurements are. It is impossible to get direct data on corruption, as by nature, such activities are hidden. People who engaged in corruption would not volunteer information; therefore, an indirect means of sourcing data would be explored. Several authors have identified the distinctive features of such a mostly clandestine phenomenon, where information is scarce and objective data are not usually available.

The first efforts to build corruption–and more largely, governance-measurements systems were rather fragmentary and inconsistent until the 1990s, with lack of reliable and contrastable data. Corruption assessment started taking place (Kaufmann *et al*. 2006) through three broad ways: (1) by gathering selected views of significant stakeholders, including surveys of businesses, public officials, international actors (such as NGOs and multilateral agencies) and individuals. (2) by tracking countries' institutional profiles, providing valuable information on opportunity spaces for corruption, such as procurement practices, administrative framework, budget management. (3) by thorough audits of projects, such as financial audits, spending reports, contrast between expected project outcomes and actual results, etc.

Objective Indicators

In the early studies of corruption, the most noticeable feature of corruption indicators was based on the 'perception'of corruption. This is called subjective measurements. This does not allow for pragmatic objective measurements. The gap between subjective and objective corruption indicators has been one of the major sources of controversy concerning corruption indicators. Pure objective measurements in corruption assessment are actually extremely rare. When several authors refer to "objective" indicators in contrast with "subjective", they are referring to perception-based indicators. The difference lies, however in the fact that subjective indicators may include generally based questions such as "Do you think that your government is corrupt?" In contrast, more "objective" perception-based indicators significantly narrow their questions to real experiences, rather than ideas, in order to get rid of attitudinal bias (Bradburn 1983). Examples of questions captured by objective measurement include: (1) "How often do you ask for bribes in exchange of services rendered?" (2) "Would you be more efficient and effective if given an inducement tip?". These are real life corruption experienced questions and it pertains to the individual directly..

Subjective Indicators

Most of indicators, however, lie on subjective measurements. Such models are currently based on polls and surveys in which individuals are requested to answer different questions intended to measure the level of corruption. Such survey may include perception-based questions or on the contrary, "experience-based" ones.

Aggregate Indicators

Beyond objective and subjective indicators, a new generation of corruption and governance indicators appeared in the mid 1990s, providing a much more sophisticated approach to corruption assessment. These new indicators are arrived at by combining several primary measures. Several names are given to these new indicators. They are "second-generation" measures (Johnston: 2000), "composite indicators" (Arndt and Oman 2006) or more commonly, "aggregate indicators" (Kaufmann *et al*. 1999). This indicator was born mostly because of the strong criticism that previous indicators had generated (Johnston 2000). Kaufmann and Kraay (2007) have identified four main benefits from aggregate indicators:(1) aggregate indicators allow a broader country coverage than individual ones; (2) they provide a functional summary from a vast array of individual indicators; (3) they average out and therefore, they reduce measurement error as well as the influence of bias of individual sources and; (4) they allow for the calculation of explicit margin of error. Although several aggregate indicators are today available, three of them have stood out because of their sophistication and very extensive use among anti-corruption practitioners:

(i) The Corruption Perception Index (CPI), published annually by Transparency International, and;

(ii) The Business Environment and Enterprise Performance Survey (BEEPS) and the

(iii) World Governance Indicators (WGI), the last two were constructed by the World Bank.

The Corruption Perception Index (CPI) is an aggregated indicator built by adding a varying set of component measures. The CPI is commonly called the "poll of polls". The CPI is constructed from many different sources, such as the World Economic Forum, the Institute for Management Development, Price Water House Coopers, Freedom House and Gallup International. Much criticism has been levelled against the CPI in terms of inaccuracy, inconsistency and real impossibility to assess what a particular given degree of corruption

means for a country. The Business Environment and Enterprise Performance Survey provides firm-level data on a broad range of issues about the business environment and performance of firms, including business-government relations, firm financing, labour, infrastructure, informal payments and corruption, and other topics such as training and innovation.

The CPI, BEEPS, and WGI are the three most important indicators used for measuring corruption. The WGI is not strictly a "corruption" indicator, because it measures other factors in order to assess a governance picture of every country. However, it is relevant to the discussion because one of the dimensions captured by the WGI is the (1) control of corruption. The other five dimensions are: (2) transparency and accountability, (3) political stability and absence of violence, (4) government effectiveness, (5) regulatory quality, and (6) rule of law.

Different indicators have featured in corruption study. Varieties of these indicators offer to those interested in understanding corruption – scholars – or in fighting – practitioners – a clear advantage because the weakness of some can be made up by the strengths of other. Indeed, the use of diverse indicators assures a more contrasted assessment and better available information for researchers and project managers. Furthermore, the large quantity of information gathered in the last 20 years, and the increasing sophistication of theoretical models explaining the causes, effects and remedies of corruption, have also a positive effect in the conception of new indicators. Nonetheless, despite these major improvements, corruption assessment is still today facing the same obstacles that it did years ago. Notwithstanding increased complexity of indicators, the challenges remain unaltered through time. Certainly, every indicator has to cope with its own problems, and modern aggregate measurements reveal new ideas. However, all these setbacks can be gathered under a few –but persistent– major problem groups. Four main problems have been identified particularly the types that summarize the challenges of corruption measurement: (1) the *perception* problem; (2) the *error* problem; (3) the *insufficiency* problem; and (4) the *actionable* problem.

The Perception problem

Perception is a necessary but not a sufficient condition for corruption. Corruption perception largely determines business and political operations. However, perception is not enough to actually determine the real phenomenon of corruption. Real data about actual corruption is a permanent demand from actors involved in corruption and governance issues. The availability, however, of such information is extremely scarce, or simply nonexistent. This situation has often been misinterpreted to denote perception indices as real level of corruption. Recent research has shown that the gap between perception of corruption and real corruption can be even larger than expected, "…implying that using corruption *perception* indices as a measure of corruption *experience* may be more problematic than suggested by the existing literature" (Donchev and Ujhelyi 2007). The necessity to rely on subjective factors (because of lack of better sources) cannot prevent the fact that even the best-built perception-based surveys have a potentially very large margin of error, particularly when compared with actual corruption. (Bertrand and Mullainathan 2001).

The Error problem

The issue of error has posed several problems for corruption measurement, and it constitute one of the most challenging areas of debate. The fact that corruption indices are based on perceptions includes a supplementary difficulty to measure the error in models for assessing corruption. Social science has extensively coped with error problem. For instance, making predictions about neighbourhood choice in relation with income level will always include a level of confidence and margin of error, obtained through statistical work. The major corruption indices include different systems to manage error in their assessment. Both the Corruption Perception Index and the World Governance Indicators report measures of error. Kaufmann and Kraay (2007) have identified two main kinds of measurement error that affect corruption and governance assessment: (1) the error relative to the specific concept that is expected to measure and (2) the imperfection by definition of any proxy for governance (or corruption) regarding a broader concept of governance. Hence, Kaufmann and Kraay's error are related first, to the inherent measurement problems in any social research (e.g. sampling error, operationalization problems, etc.) and second, to the very nature of corruption assessment.

The Utility problem

One of the main reasons of the boost in corruption research is due to the boosted interest of major international development agencies upon the issue. This problem arises based on the fact that there has been a gap between proper understanding of what corruption constitutes and the type of policy to use to address the problem. Corruption indicators have been largely criticized for offering too broad corruption assessments, difficult to convert into concrete anti-corruption efforts. The ubiquitous uncertain nature of corruption prevents measurement to be an easy source for straightforward solutions. In conclusion, corruption assessment has proved to be a complicated task subject to several difficulties such as the lack of objective data, the error measurement both endogenous and exogenous to corruption, and the complexity to build effective bridges from measurement –the "problem"– to policies–the "solution".

The Actionable problem

Actionable indicators tend to be more efficient and effective when used in combination with other systems. In spite of that, actionable indicators elicit several concerns. First, measurement does not necessarily mean utility, actionable indicators can easily lead to create a "reform illusion" (Kauffman and Kraay 2007). Second, because of the very nature of actionable indicators (linked to clear and identifiable policy components), national authorities interested in improving their corruption ranking – but not necessarily in really fighting corruption– can 'act' on those elements (for instance, the creation of a commission for the Modernization of the Civil Service) without effectively change the situation of corruption in the country.

CHAPTER FOUR

THEORETICAL FRAMEWORK AND METHODOLOGY

4.1 Introduction

This chapter proposes the theoretical framework that would guide the direction of this study. It also provides a platform to add to the body of knowledge in this study area through the use of existing theories to extend the frontiers of the theoretical knowledge. This chapter therefore specifies the theoretical framework and methodology for the study. Two cases where corruption operates were identified: linear and a non-linear relationship between corruption intensity and tax revenue. The baseline specification of the model used in this chapter is in line with the model built by Barro (1990). The model comprised of three economic agents: representative consumer, representative firm and the government. The behaviour of these actors serve as reference point of analysis of corruption model used in this chapter. The last part in this section explains the estimation technique and data sources explored in the study.

4.2 Theoretical Framework

The endogenous growth model[27] was explored to explain the relationship between corruption and economic growth. This model assumed that output and growth are influenced by the level of corruption. It therefore implies that if one of the physical inputs in the production function suffers a quality loss in the presence of corruption, then, this would have implication on long run growth and steady state level of output. In this study, the work of Dissou and Yakautsava (2012) serves as the building framework of our model.

4.2.1 The Model

The model specified in this study is in line with Barro (1990)[28] model. The model comprises of three economic agents: consumer, firm and the government. The consumer maximizes its intertemporal utility subject to a given budget constraint. The consumer owns the representative firm. The firm's production technology relies on private and public capital to produce output. The representative consumer spends its after-tax income on consumption and investment in future private capital. The government collects flat-rate income taxes and seeks

[27]. More importantly, variants of endogenous growth model including Lucas (1988) model, Jones and Manuelli (1990) model, Barro(1990) model, AK model of Rebelo (1991) etc. have demonstrated that policy variables can have significant impact on long run economic growth.

[28]. The model permits the inclusion of a wider range of policy variables including corruption. This model provides both the theoretical foundation and analytical tool for analysis of impact of corruption on economic growth.

to run a balanced budget. If the government is honest, all collected taxes are invested in the private productive process in the form of public capital, which, in turn, is used as a productive input. If the government is corrupt, only a fraction of tax revenues is passed on to the private productive process in the form of public capital, while bribe becomes an implicit consumption, which the representative consumer takes as given.

4.2.2 The Representative Consumer

The economy comprised of an infinitely-lived representative consumer who derives utility from consumption. Consumer's intertemporal utility function is as follows:

$$u = \int_0^{\infty} e^{-\rho t}\left(\frac{C_t^{1-\sigma} - 1}{1 - \sigma}\right) dt \qquad (4.1)$$

Where: ρ is the rate of time preference, σ is the inverse of the intertemporal elasticity of substitution and C_t is consumption at time t.

4.2.3 The Firm

The consumer owns the representative firm, and have access to Cobb-Douglas production technology. The firm's production function is given as:

$$Y_t = K_t^{1-\alpha} G_t^{\alpha} \qquad (4.2)$$

The two inputs, K_t and G_t, represent private capital and public capital respectively[29]. The production function exhibits constant and diminishing marginal returns to each input taken separately. Public capital is funded with tax revenues derived from a proportional tax levied on output. Government spending on public capital is considered a productive and an essential input for firm production.

4.2.4 The Government

The government levies a proportional tax on output with the requirement of running a balanced budget:

$$G_t = \tau Y_t, \qquad 0 < \tau < 1 \qquad (4.3)$$

Equation (4.3) simply states that government spending on public capital equals the amount collected from taxation. If the government is honest, no tax revenue is pocketed by corrupt

[29]. The traditional functional form of Cobb-Douglas production function usually include a constant technology parameter A as in $Y_t = AK_t^{1-\alpha} G_t^{\alpha}$. Here, A is assumed to equal 1.

bureaucrats; rather all tax revenue is spent on public capital. Assume that the representative firm cannot influence the government's decision and takes the levied tax as given. The production function can be rewritten using (4.3) as:

$$Y_t = K_t^{1-\alpha}(\tau Y_t)^{\alpha} \tag{4.4}$$

Isolating Y_t, the production function becomes:

$$Y_t = \tau^{\alpha/1-\alpha} K_t \tag{4.5}$$

This is AK-type production function, where the private marginal production of capital is $\tau^{\alpha/1-\alpha}$. The consumer spends its after-tax income on consumption goods and savings, which are subsequently invested. Formally, we have $(1-\tau)Y_t = C_t + \dot{K}$. Since $G_t = \tau Y_t$, it is possible to rewrite the aggregate budget constraint for the economy as:

$$Y_t = C_t + \dot{K} + G_t \tag{4.6}$$

Equation (4.6) is based on consumer's budget constraint. Private capital evolves according to the following law of motion:

$$\frac{dK_t}{d_t} = \dot{K} = (1-\tau)Y_t - C_t \tag{4.7}$$

The consumer maximizes utility as defined in (4.1) subject to its budget constraint (4.7). Using (4.5), this constraint can be rewritten as (substituting 4.5 into 4.7):

$$\dot{K} = (1-\tau)\tau^{\alpha/1-\alpha} K_t - C_t \tag{4.8}$$

The maximization problem in equation (4.8) can be solved with the use of Hamittonian[30], which yields the following Euler equation:

$$\frac{\dot{C}}{C} = \gamma = \frac{1}{\sigma}\{(1-\tau)\tau^{\alpha/1-\alpha} - \rho\} \tag{4.9}$$

[30]. Denoting $\varphi = e^{-\rho t}$, the Hamiltonian for this maximization problem is $H = \varphi\left[\frac{C_t^{1-\sigma}-1}{\sigma-1}\right] + \lambda\left[(1-\tau)\tau^{\frac{\alpha}{1-\alpha}}K_t - C_t\right]$. To solve for the optimal consumption path first-order condition (F.O.C) require that:

$\frac{\partial H}{\partial C} = 0 \Rightarrow \varphi C_t^{-\sigma} = \lambda$ and $\frac{\partial H}{\partial K} + \lambda = 0 \Rightarrow \lambda = -\lambda(1-\tau)(1-\alpha)\left[\frac{G_t}{K_t}\right]^{\alpha}$ Differentiating with respect to time and combining the above F.O.C we obtain the Euler equation (4.9).

In equation (4.9), γ is the general growth rate, corresponding to the growth rate of output[31]. By inspection of (4.9), it is evident that the tax has two opposing effects on growth. The tax powers growth directly because it enters negatively in the term within the parentheses. At the same time, the tax raised growth indirectly by increasing the private marginal product of capital. According to this logic, there is a positive tax rate that maximizes growth, α[32].

If government is corrupt. It implies that not all collected tax revenues are channelled back into private production in the form of public capital. Only a specific fraction of tax revenues collected is used in the production process as public capital, G_t. The remainder $\boldsymbol{\varepsilon_t}$ is a distortion associated with government intervention and represents bribery. Consider the following government budget constraint:

$$\boldsymbol{G_t = \tau Y_t - \varepsilon_t} \qquad (4.10)$$

Where $\boldsymbol{G_t}$ is effective government spending on public capital. $\boldsymbol{\tau Y_t}$ is the collected tax revenues, and $\boldsymbol{\varepsilon_t}$ represents total bribes collected and diverted from production. We shall consider two different cases in which corruption may operate.

4.2.5 Case 1

We assume a situation where bribe is linear in the tax revenues collected:

$$\boldsymbol{\varepsilon_t = \mu \tau Y_t, 0 < \mu < 1} \qquad (4.11)$$

Where μ is corruption intensity. An increase in μ correspondingly increases corruption. This implies that no matter the tax rate the government decides to levy for a given level of output, there is always a constant fraction of tax revenues "pocketed away". Combining (4.10) and (4.11), the corrupt government's budget constraint becomes:

$$\boldsymbol{G_t = (1-\mu)\tau Y_t} \qquad (4.12)$$

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[31]. Growth expression in (4.9) is similar to Barro (1990)'s specification.
$\frac{\dot{C}}{C} = \gamma = \frac{1}{\sigma}\left\{(1-\tau)(1-\alpha)\phi\left(\frac{G_t}{Kt}\right) - \rho\right\}$

[32]. As shown in Barro (1990): $\frac{d\gamma}{d\tau} = \frac{1}{\sigma}\phi\left(\frac{G_t}{Kt}\right)(\phi - 1)$ where growth-maximizing condition requires $\phi = 1$. If $\phi^1 \mathbf{x} \left(\frac{G_t}{Y_t}\right)$ is the elasticity of output with respect to government spending, which is constant and equal to a with Cobb-Douglas technology, then this condition implies that growth maximizing tax rate is $\frac{G_t}{Y_t} = \tau = \alpha$.

Only a fraction $(\mathbf{1}-\boldsymbol{\mu})$ of tax revenues is used for public capital. The rest is consumed by rent-seekers, who are part of the population. Equation (4.12) can be substituted into the production function (4.2) to obtain:

$$\boldsymbol{Y_t} = [(\mathbf{1}-\boldsymbol{\mu})\boldsymbol{\tau}]^{\alpha/1-\alpha}\boldsymbol{K_t} \tag{4.13}$$

Corruption intensity lowers private marginal product of capital $[(\mathbf{1}-\boldsymbol{\mu})\boldsymbol{\tau}]^{\alpha/1-\alpha}$ in equation (4.13). An increase in corruption intensity shifts down the marginal product of capital. It should be noted that bribe constitutes windfall consumption for the representative consumer. The maximizing consumer decides only on his consumption and saving levels; the bribe does not enter its decision set. The consumer's after tax income is spent on consumption and saving. Since $\boldsymbol{\tau Y_t} = \boldsymbol{G_t} + \boldsymbol{\varepsilon}$, output is spent on consumption, investment, effective public spending and on a total bribe as shown in the aggregate budget constraint:

$$\boldsymbol{Y_t} = \boldsymbol{C_t} + \dot{\boldsymbol{K}} + \boldsymbol{G_t} + \boldsymbol{\varepsilon_t} \tag{4.14}$$

Referring back to the budget constraint of the consumer $(1-\tau)\mathrm{Y_t} = C_t + \dot{K}$ and taking note of (4.13), capital evolves according to the new equation of motion:

$$\dot{\boldsymbol{K}} = [\mathbf{1}-\boldsymbol{\tau}][(\mathbf{1}-\boldsymbol{\mu})\boldsymbol{\tau}]^{\alpha/1-\alpha}\boldsymbol{K_t} - \boldsymbol{C_t} \tag{4.15}$$

Equation (4.15) reveals how corruption acts as hindrance to capital accumulation. Since bribe is windfall consumption, the consumer's utility function is modified to reflect the windfall gain from bribes as shown in equation 4.16:

$$U(C_t) + V(\varepsilon_t),\ where\ U(C_t) = (C_t^{\,1-\sigma} - 1)\,\frac{1}{1-\sigma} \tag{4.16}$$

The consumer maximizes (4.16) subject to (4.15). Using the Hamiltonian and the first order condition, the following growth rate is derived:

$$\boldsymbol{\gamma} = \frac{\mathbf{1}}{\boldsymbol{\sigma}}\{[\mathbf{1}-\boldsymbol{\tau}][(\mathbf{1}-\boldsymbol{\mu})\boldsymbol{\tau}]^{\alpha/1-\alpha} - \boldsymbol{\rho}\} \tag{4.17}$$

Equation (4.17) reveals that corruption intensity parameter, μ, lowers the private marginal product of capital thereby decreasing growth. The optimization condition, $\frac{dy}{d\tau} = \mathbf{0}$, yields the growth-maximizing tax rate $\boldsymbol{\tau} = \boldsymbol{\alpha}$, which does not depend on the corruption parameter.

4.2.6 Case 2

In this section, corruption intensity is introduced in a non-linear form. Consider the following government's budget constraint:

$$G_t = \tau^{\theta} Y_t, \quad \theta \equiv 1 + \mu \tag{4.18}$$

Where μ $(\mu \geq 0)$ is corruption intensity such that when $\mu = 0$ government is honest and spends all tax revenues on public capital. When $\mu = 0$, the government displays corrupt behaviour by lowering the fraction of tax revenues used for public capital[33]. It follows that a positive amount $\varepsilon_t = (1 - \tau^{\mu})\,\tau Y_t$ is wasted on unproductive consumption. The fraction diverted from productive public spending, $(1 - \tau^{\mu})$ is increasing in corruption intensity, μ, at a decreasing rate[34]. The firm continues to take both the tax rate and the corruption intensity parameter as given. Its production function becomes:

$$Y_t = [\tau]^{\frac{(1+\mu)\alpha}{1-\alpha}} K_t \tag{4.19}$$

The private marginal product of capital is lower than that in the corruption-free model:

$$[\tau]^{\frac{(1+\mu)\alpha}{1-\alpha}} < [\tau]^{\frac{\alpha}{1-\alpha}} \tag{4.20}$$

In contrast to case 1, corruption intensity reduces the private marginal product of capital in a non-linear fashion. The consumer's optimization problem is similar to the one described in case 1, with the exception that the consumer now maximizes (4.16) subject to a new capital accumulation equation (4.21)

$$\dot{K} = (1 - \tau)\tau^{\frac{(1+\mu)\alpha}{1-\alpha}} K_t - C_t \tag{4.21}$$

The output growth rate is calculated as follows:

$$\gamma = \frac{1}{\sigma}\left\{(1 - \tau)\tau^{\frac{(1+\mu)\alpha}{1-\alpha}} - \rho\right\} \tag{4.22}$$

The tax rate that maximizes (4.22) is computed as:

$$\tau^{*} = \frac{(1-\mu)\alpha}{1+\mu\alpha} \tag{4.23}$$

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[33]. Although there are other non-linear functional forms that can be used, the functional form in (4.18) is most mathematically convenient.

[34]. Let $F(\mu) \equiv (1 - r^{\mu})$ be the fraction of tax revenues allocated to consumption via corruption, then $\partial F/\partial \mu = \tau^{\mu} \ln \tau > 0$ *and* $\partial^2/\partial \mu^2 = -\tau^{\mu}(\ln \tau)^2 < 0$.

The model suggests that output and growth are influenced by the level of corruption. If one of the physical inputs in the production function suffers a quality loss in the presence of corruption, then this will also affect growth and steady state of output. This study extends the model to include corruption as a determinant of the multifactor productivity. However, corruption enters the growth model through productivity growth. The model is modified by incorporating corruption and other determinants into the production equation. An augmented production function is obtained as specified in equation (4.24).

$$Y_t = AK^{1-\alpha}G_t^{\alpha} \quad (4.24)$$

$$A = A(0)e^{\lambda t} \quad (4.25)$$

Where A = Productivity Index

λ = Technological progress

A(0) represents initial conditions.

An important measure of the economy's performance is efficiency in the use of productive resources. Corruption affects the efficiency of public and private sector inputs and it also imposes constraints on the total factor productivity (A) component of the production function. Incorporating equation (4.25) into equation (4.24), we obtain equation (4.26) which signifies the total output of the economy.

$$Y_t = A(0)e^{\lambda t} K^{1-\alpha}G_t^{\alpha} \quad (4.26)$$

Expressing equation 4.26 in log-linear form gives:

$$logY = log\ A(0) + \lambda t + (1-\alpha)logK + \alpha\ log\ G \quad (4.27)$$

Differentiating with respect to time yields;

$$dlogY = \lambda + (1-\alpha)dlogK + \alpha\ dlogG \quad (4.28)$$

4.3 Model Specification

Dissou and Yakautsava (2012) gave the basic approach of assessing the effect of corruption on growth and how it affects efficiency through resource misallocation. However, the factor productivity approach was used to analyzed the impact of corruption on economic growth. The empirical models for this study are grouped into two sets of equations comprising of productivity and growth equations. The interaction of the variables in the model would have significant implications for both estimation and interpretation of the model's parameters. This

study is built on the framework that corruption affects economic growth through productivity outcome. Following this, productivity is therefore expressed as a multi factor inputs. Originally, the production function was expressed in form of Cobb-Douglas production function focusing on two factor inputs, capital, K and labour, L.The neoclassical theory used this framework to obtain the total factor productivity (TFP) growth in the form of residual, calculated by subtracting the contribution of capital and labour inputs from the output growth. With this approach, output elasticities with respect to each factor inputs are not sufficiently observable to compute technical change. Measuring the growth rates of output is easy to compute but that of the growth rates of capital and labour are more difficult. Technology is not observable, it only reflect as a residual when changes in measured output are not fully matched by changes in measured inputs.

The estimates of total factor productivity growth with two factor inputs are very sensitive to assumptions, particularly on the degree of scale of economics and the underlying parameters of the production function. The specification of the production function only captures the driving forces that bring about economic growth under the neoclassical model of growth. However, such specification does not provide an explicit account of any other forces that drive growth in the short-run. From a practical standpoint, the use of Cobb-Douglas production function for estimating Solow residual has some clear limitations. One noteworthy limitation is the implicit restriction of assuming that substitution elasticity is unitary for factors of production, which considerably reduces its range of applicability. In the neoclassical production function, output depends on physical capital stock, labour input and level of technology. These inputs are assumption driven and may work inappropriately with growth terms. The productivity growth specified in this study is free of neoclassical assumptions and restrictions. Given the limitations and restrictions of working with the Cobb-Douglas production function, an alternative specification of the production function is hereby advocated as specified by equation 4.29.

A Barro (1990) type endogenous growth model was used to estimate the relationship between corruption and economic growth in Nigeria. The modifications in the model was the inclusion of corruption index and the introduction of openness to trade, national system of innovation, parallel market exchange rate premium, real exchange rate, law and order, and real interest rate to productivity equation. The inclusion of trade openness in the productivity equation is justified on the ground that countries that are more open to foreign markets tends to have better

productivity outcomes and improved technological innovation. This view found empirical support from the works of Baily and Gersbach (1995), Tybout (2000) and Miller and Upadhyay (2000). Efficiency and productivity are essential concepts in every economist's tool kits. National innovation system has been hypothesized to facilitate knowledge spillovers capable of enhancing productivity efficiency. Stable macroeconomic environment with appropriate culture of law and order could facilitate innovation system and diffusion of ideas which could promote productivity. It is on the basis of this that we have included national innovation system and variable capturing law and order into the productivity equation to ascertain their degree of influence. Real exchange rate and real interest rates are financial variables which directly and indirectly affects productivity through variations in their competitive rates. The introduction of these variables was meant to explain the short run effect of corruption on productivity. The inclusion of parallel market exchange rate premium and corruption index into the productivity equation is justified on the ground that both variables are proxies for corrupt practices and may affect productivity. However, fitted productivity growth, capital expenditure and taste of consumers' are included among the growth variables to account for long run effect of corruption on economic growth. The models are presented below.

$$PGRT_t = \gamma_0 + \gamma_1 OPENS_t + \gamma_2 NSI_t + \gamma_3 LAWOR_t + \gamma_4 PARMK_t + \gamma_5 REXR_t + \gamma_6 RIR_t + \gamma_7 COR_t + \varepsilon_t \quad (4.29)$$

$$RGDP_t = \alpha_0 + \alpha_1 PGRTST_t + \alpha_2 GE_t + \alpha_3 TRGD_t + \varepsilon_t \quad (4.30)$$

Table 4.1 gives the description of the variables used in the model. Equation 4.29 and 4.30 captures the direct and indirect effect of corruption on productivity and economic growth in Nigeria. We expect equations 4.29 and 4.30 to have the following signs: $\gamma_1, \gamma_2, \gamma_3 > 0$, $\gamma_6, \gamma_7 < 0$, $\gamma_4, \gamma_5 <> 0$ and $\alpha_1, \alpha_2, \alpha_3, > 0$. This implies that we expect a positive relationship between openness to trade (OPENS), national system of innovation (NSI), law and order (LAWOR), and productivity growth (PGRT). Real interest rate (RIR) and corruption (COR) are expected to influence productivity growth negatively. Parallel market exchange rate premium (PARMK) and real exchange rate (REXR) coefficients may be either positive or negative. Similarly, capital expenditure (GE), fitted productivity growth (PGRTST) and consumers' tastes (TRGD) are expected to influence economic growth (RGDP) positively.

4.4 Model Estimation Technique

The data employed in the study were estimated in phases starting with the unit root test, co-integration analysis and estimation of error correction mechanism (ECM). Specifically, unit root test was conducted to detect the order of integration of the variables using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests respectively. The cointegration technique was used to capture long-run impact of corruption on economic growth while the ECM was employed to measure the short-run dynamics of corruption. The first step is to determine the order of integration of the variables before testing for co-integration and the ECM. The data were converted to natural logarithms for conventional statistical reasons.

4.5 Test for Stationarity

The time series properties of the variables used in the models were ascertained in order to avoid spurious regression results. To test for stationarity, there are a number of statistics. However, there are three methods that are commonly used. These include: Dickey-Fuller (DF) test, Augmented Dickey-Fuller (ADF) test, and Sargan-Bhargavan Durbin-Watson (SBDW) test. The ADF is used in view of the drawback of the DF test which assumes that the data generating process (DGP) is an AR(1) process. If this is the case, then the existence of autocorrelation in the error term of the equation will lead to a bias in the test. Thus, in the effort to overcome this problem, the ADF test is usually carried out. The tests for stationarity are based on the regression:

$$\Delta y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{k=1}^{L} r_1 \Delta Y_{t-k} + \Sigma_t \qquad (4.31)$$

Where;

k = length of lag on the dependent variable necessary to make Σ, white noise

Σ = white-noise process

For the regression equation, the following holds.

(i) The null hypothesis is that $\alpha_1 = 1$, i.e., the variable Y_1 has unit root or is non stationary

(ii) The alternate hypothesis is $\alpha_1 = 0$; i.e., the variable is stationary or integrated of the order 0 - 1(0).

(iii) A large negative value for the coefficient, α_1, leads to the rejection of the null hypothesis.

(iv) On apriori ground, the rejection or acceptance of the null hypothesis is done on the basis of the value of the test statistic given the sign in (iii). The test statistic is the conventional t-test on α_1(i.e., the coefficient of Y_{t-1}). The computed t-statistic (t) is compared with the critical values of (t_c) given the size of the sample. If t^{cal} is greater than t^{tab} or $p < 0.05$ (given 5% level of significance, the null hypothesis is rejected).

To conduct the DF and ADF tests, the sample size for the time series must lie between 25 and ∞. The ADF test was carried out on the levels of the variables, and their differences to test for stationarity.

4.6 Definition of Variables and Data Sources

The data employed for this study are from a number of sources which include primary and secondary sources. The summary of definition of variables employed in the study and data sources are presented in the Table 4.1.

Table 4.1 : Summary of Definition of Variables and Data Sources

Variable	Description of Variable	Definition of Variable	Source of Data
RGDP	Real Gross Domestic Product Growth Rate	Real Gross Domestic Product is defined as quantitative measure of a nation's total economic activity. It is measured in 1990 constant basic prices.	Central Bank of Nigeria, Statistical Bulletin,2012.
PGRT	Observed Productivity Growth	Productivity is a measure of the rate at which outputs of goods and services are produced per unit of input (labour, capital, raw materials, etc). It is calculated as the addition of employed labour and capital productivities divided by the total employed labour force.	Productivity data were computed from CBN : Statistical Bulletin (Various Issues); Nigeria Economic Financial and Banking Indicators (Various Issues); FOS:Annual Abstract of Statistics (Various Issues); Nigeria Labour Force Statistics (2010) and UNCTAD handbook of statistics, 2008.
OPENS	Openness to Trade	Openness to trade is defined as the addition of import and export divided by GDP	Central Bank of Nigeria, Statistical Bulletin,2012.
NSI	National system of innovation	National system of innovation (R/D) is defined as the share of research and development in total government spending (Actual Spending).	International Financial Statistics(various issues), Central Bank of Nigeria Bullion (various issues), and the World Bank Development indicator online.
LAWOR	Law and Order	Law and order (LAWOR) is defined as proportion of government expenditure on security (Actual Spending).	Central Bank of Nigeria, Statistical Bulletin,2012.
PARMK	Parallel market exchange rate premium	Parallel market exchange rate premium(N/$) is defined as parallel market exchange rate minus official exchange rate divided by official exchange rate multiplied by 100.	Central Bank of Nigeria Annual Reports and Statement of Accounts(2007), Central Bank of Nigeria, Statistical Bulletin,2012.
TRGD	Tastes of Consumers	Proxied by terms of trade which captured the tastes of foreign and domestic goods.	Central Bank of Nigeria Statistical Bulletin (2012).
GE	Capital Expenditure	Government capital expenditure.	Central Bank of Nigeria Statistical Bulletin (2012)
PGRTST	Fitted Productivity	Obtained from the OLS estimation	

	growth		
RIR	Real interest rate	Real interest rate (RIR) is the lending interest rate adjusted for inflation as measured by the gross domestic product (GDP) deflator.	Central Bank of Nigeria Statistical Bulletin (2012)
REXR	Real exchange rate	The real exchange rate (RER) is the purchasing power of a currency relative to another at current exchange rates and prices. It is the ratio of the number of units of a given country's currency necessary to buy a market basket of goods in the other country, after acquiring the other country's currency in the foreign exchange market, to the number of units of the given country's currency that would be necessary to buy that market basket directly in the given country.	Central Bank of Nigeria Statistical Bulletin (2012)
COR	Corruption	Corruption index ranges from 0 to 10. Index of 0 indicates a highly corrupt country while an index of 10 indicates a highly clean country.	Corruption index obtained from Transparency International website.

Source : Compiled by the Author

CHAPTER FIVE

MODELLING PRODUCTIVITY GROWTH

5.1 Introduction

This chapter attempted to model productivity based on the specification of Owyong (2001). There are quite a number of definitions on productivity with different specifications. However, these definitions converged in concepts and submissions. The most commonly used term to explain productivity is total factor productivity (TFP). Total Factor Productivity has the advantage of combining all factor inputs used in production process for estimation rather than just a single factor input. This chapter further explained some measurement concepts of productivity and the relationship among total factor productivity, output and labour productivity growth. Methodological procedures used in estimating productivity growth were also analyzed in this chapter.

5.2 Definitions of Productivity

Eatwell and Newman (1991) defined productivity as a ratio of some measure of output to some index of input used. In a clear term, productivity is nothing more than the arithmetic ratio between the amount produced and the amount of any resources used in the course of production. This definition enjoys general acceptability because of two related considerations. One, the definition suggests what productivity is thought of to be in the context of an enterprise, an industry or an economy as a whole. Two, regardless of the type of production, economic or political system, this definition of productivity remains the same as long as the basic concept is the relationship between the quantity and quality of goods and services produced and the quantity of resources used to produce them. It is evident in the literature that virtually all the definitions of productivity centre on 'outputs' and 'inputs'.

Productivity as a concept can assume two dimensions: namely total factor productivity (TFP) and partial productivity (PP). The total factor productivity relates to productivity that is defined as the relationship between output produced and an index of composite inputs. Total factor productivity is also known as 'multi-factor productivity'. In partial productivity, output is related to any factor input implying that there will be as many definitions of productivity as inputs involved in the production process whereby each definition fits a given input. For example, when output is associated with per man-hour or per unit of labour, this definition of productivity is a partial one and it relates to labour productivity. Partial factor productivity is equally known as average product

(Felipe 1997).The most commonly used and acceptable term to explain productivity is total factor productivity. Total factor productivity combined productivities of all inputs, rather than just a single factor. All the factor inputs used in the production process are included. The advantage of using the total factor productivity is that it allows for measuring variability among factor inputs.

5.2.1 Total Factor Productivity : Some Measurement Concepts

In a very simple language, total factor productivity is the weighted average productivity of all inputs, where the weights to these inputs are their shares in the total cost of production. Following Owyong (2001), total factor productivity (TFP) is measured as the ratio of output Y to aggregated input X:

$$TFP = \frac{Y}{X} \qquad (5.1)$$

Since there are multiple inputs, X has to be computed by aggregation. Using the definition of divisia indexes, the growth rate of the aggregated input is equal to the weighted sum of the individual inputs' growth rates:

$$\frac{dx}{x} = \sum_{i=1}^{I} v_i \frac{dx_i}{x_i} \qquad (5.2)$$

Where x_i is quantity of input i and v_i is the weight assigned to input i.

$$v_i = \frac{(\text{Unit cost of input i})(\text{units of input i employed})}{\text{Total expenditures for all inputs}} \qquad (5.3)$$

Instead of having just a single type of output, there are multiple outputs. Using divisia indexes again, we have:

$$\frac{dY}{Y} = \sum_{i=1}^{J} wj \frac{dy_j}{y_j} \qquad (5.4)$$

where y_j is the quantity of the j^{th} output produced, with the weight w_j being the share of total revenue contributed by the j^{th} output. Combining equation (5.2) and (5.4) leads to the following expression for TFP growth:

$$\hat{TFP} = \sum_{j} w_j \, y_j - \sum_{j} v_i \, x_i \qquad (5.5)$$

Where the hats represent growth rates and the weights are functions of the relevant prices and quantities:

$$w_j = \frac{q_i y_j}{\Sigma_j q_i y_j} \text{ and } v_i = \frac{p_i x_i}{\Sigma_i p_i x_i} \quad (5.6)$$

where q_j and p_i are the prices of the j^{th} output and i^{th} input, respectively. The firm is assumed to maximize profits subject to the constraint of the production technology, which is given by:

$$(y_1, \ldots, y_j) = F(x_1, \ldots, x_i) \quad (5.7)$$

where profits are given as follows:

$$\prod = \Sigma q_i y_j - \Sigma p_i x_i \quad (5.8)$$

If the production technology follows constant returns to scale, then

$$\Sigma_j q_j y_j = \Sigma_i p_i x_i \quad (5.9)$$

Differentiating equation (5.9) with respect to time and dividing both sides by the corresponding total value yields:

$$\Sigma_j w_j [\hat{q}_j + \hat{y}_j] = \Sigma_i v_i [\hat{p}_i + \hat{x}_i] \quad (5.10)$$

Equation (5.5) implies that the rate of growth of *TFP* is equal to the aggregate growth rate of output minus the aggregate growth rate of inputs. In addition when equation (5.10) is used, it may be shown that:

$$\hat{TFP} = \Sigma_i v_i \hat{p}_i - \Sigma_j w_j \hat{q}_j \quad (5.11)$$

which implies that the rate of *TFP* growth is equal to the average rate of growth of input prices less than average rate of growth of output prices (Owyong, 2001).

5.2.2 Relationship among TFP Growth, Output Growth, and Labour Productivity Growth

For small changes in a variable, the rate of change from one time period t to $t + 1$ is closely approximated by the corresponding difference in logarithms. Thus, for any variable Z,

$$\dot{Z} = \frac{Z_{t+1} - Z_t}{Z_t} \approx \ln Z_{t+1} - \ln Z_t \quad (5.12)$$

Given this useful result, the total factor productivity *(TFP)* in equation (5.5) can be reformulated by replacing all growth rates by the corresponding log differences. The growth rate of *TFP* is:

$$\dot{TFP} = l_n TFP - l_n TFP_{t-1} = \Sigma_i \bar{v}_{i,t} (l_n (y_t / x_{i,t}) - l_n (y_{t-1} / x_{i,t-1})) \quad (5.13)$$

where average expenditure share $\bar{v}_{i,t} = 0.5 (v_{i,t} + v_{i,t-1})$. In this form it becomes clear that the growth

of total factor productivity is the weighted sum of the growth rates of all single factor productivities. Put in another way, output is equal to the sum of the *TFP* growth rate and the growth rate of the average input.

$$\hat{Y}_t = \sum_i \bar{v}_{i,t} \hat{X}_{i,t} + T\hat{F}P \quad (5.14)$$

The growth rate of the productivity of any input can be expressed in terms of the rates of growth of the ratios of all other inputs to that input, and the growth of *TFP*.

5.2.3 Extension to the Economy

At the level of the economy, the aggregate production function in Cobb-Douglas ($AK^{\beta}L^{1-\beta}$) type is expressed as:

$$logY_t = \propto + \beta logk_t + (1-\beta) logl_t + logu_t \quad (5.15)$$

Differentiating the above expression with respect to time yields:

$$\hat{Y}_t = \beta\hat{K}_t + \mu\hat{L}_t + T\hat{F}P \quad (5.16)$$

The parameters β and μ represent the share of total input cost in the Cobb-Douglas formulation. Measures of total factor productivity may be obtained by deducting the input growth rates from output growth. This approach to decompose the total growth of output in the economy into its different potential factors is called growth accounting. These factors are to explain output movements; what is left unexplained is considered as total factor productivity.

5.3 Estimation of Productivity Growth

There are two commonly used methodologies for estimating productivity growth. These include: growth accounting and econometric estimation of production functions.

5.3.1 Growth Accounting Approach

The growth accounting framework was first formalized by Solow(1957). Given a Cobb-Douglas production:

$$Y = AL^{\propto}K^{\beta} \quad (5.17)$$

Productivity index is expressed as:

$$A = \frac{Y}{\propto L + \beta K} \text{ and } A = \frac{Y}{L^{\propto}K^{\beta}} \quad (5.18)$$

The first expression is an arithmetic index and the second a geometric. A denotes the productivity

index; Y, L and K are output, labour and capital, respectively; and ∝ and β are the elasticities. The aggregate production function in equation (5.17) can be re-written as:

$$\boldsymbol{Y_t = F[K_t, L_t, t]} \quad (5.19)$$

Equation (5.19) expresses output as a function of the stock of capital, labour, and a shift factor (t), time. If argument "t" is separable from K and L.

$$\boldsymbol{Y_t = A_t F[K_t, L_t]} \quad (5.20)$$

Expression A_t can be written:

$$A_t = \frac{Y_t}{F[K_t, L_t]} \quad (5.21)$$

A_t is exogenous, disembodied, and Hicks-neutral technical progress, and is measured by how output changes as time elapses with the input bundles held constant. With the aid of marginal productivity theory, growth accounting decomposes the growth of output into growth of labour, capital and other miscellaneous sources. Growth accounting approach to Total Factor Productivity(TFP) measurement is operationalized by finding the difference between growth of output and the growth of the weighted sum of all inputs, to obtain output growth associated with what Solow referred to as technical change or residual. It is usually expressed in growth rates, that is:

$$\boldsymbol{F(K,L,t)} = \frac{dA_t}{d_t} = \varphi_t = q_t - \frac{L_t}{Y_t} \cdot \frac{\partial Y_t}{\partial L_t} l_t - \frac{K_t}{Y_t} \frac{\partial Y_t}{\partial K_t} K_t \quad (5.22)$$

Where q_t, l_t, k_t denote the growth rates of output, labour, and capital, respectively, and φ_t is the rate of total factor productivity growth. The expressions in front of the growth rates of the factors are the respective elasticities. Under the condition of perfect competition and profit maximization, the price elasticity of demand is infinite; factor elasticities equal the factor shares in output, and thus equation (5.22) becomes:

$$\varphi_t = q_t - a_t l_t - (1 - a_t) k_t \quad (5.23)$$

Where a_t and $(1 - a_t)$ are the labour and capital shares respectively (this is the so-called Divisia index weighing system). Expression (5.23) is called "Solow–residual". The objective of this method is to determine how much economic growth is due to accumulation of inputs and how much can be attributed to technical progress (Nelson, 1973). Standard growth accounting following Solow (1957) assumes the existence of an aggregate neoclassical production function, homogenous of degree one,

with constant returns to scale, diminishing returns to each input, and a positive elasticity of substitution.

5.3.2 Econometric Estimation Approach

Many different functional forms of econometric estimation of productivity growth existed. The choice among different functional forms is generally based on the type of analysis to be carried out. Some functions simplify computation of elasticity formulas and specification of constraints such as constant returns to scale, some facilitate consideration of dynamic interactions, some allow curvature conditions to be directly imposed, and some enhance the ability to identify the difference between short-run and long-run behaviour. Most modern studies of production technology, however, do rely on some type of flexible functional form, which allows generality in terms of interactions among arguments of the function, such as substitution among inputs. One example of a flexible functional form which has been used extensively for the analysis of production is the translog function. The translog production function, assuming instantaneous adjustment of all inputs is of the form:

$$lnY_t = \alpha_0 + \alpha_k \ln K_t + \alpha_L \ln L_t + \alpha_t t + 0.5\, B_{KK}(\ln K_t)(lnK_t) + B_{KL}(\ln K_t)(\ln L_t) + B_{Kt}(\ln K_t).t + 0.5\, B_{LL}(\ln L_t)(\ln L_t) + B_{Lt}(\ln L_t).t + 0.5\, B_{tt}(t)(t) \quad (5.24)$$

where the assumption of constant returns to scale implies that:

$$\alpha_K + \alpha_L = 1, B_{KK} + B_{KL} = B_{LL} + B_{KL} = B_{Kt} + B_{Lt} = 0 \quad (5.25)$$

It is clear from observation that the translog function is a generalization of the Cobb-Douglas functional form. The Cobb-Douglas form is restrictive in terms of the implicit substitution assumptions: elasticities of substitution between all inputs are one and shares of the inputs are constant. Extending the Cobb-Douglas to the translog function enables these constraints to be relaxed because cross-effects between inputs are recognized and therefore more complex substitution patterns can then be captured.

5.3.3 Decomposition of Total Factor Productivity from Production Function

Assume aggregate output is represented by the Cobb-Douglas production functional form[35]:

[35]. TFP summarizes both the degree of utilization of factor inputs as well as their technological level. Thus TFP = $(E_L^{\alpha}\, E_K^{1-\alpha})(U_L^{\alpha} U_K^{1-\alpha.})$. where :$(U_L, U_K)$ = Degree of Excess Capacity, (E_L, E_K) = Level of Efficiency

$RGDP = TFP\ (L^{\alpha}\ K^{1-\alpha})^{\gamma}$ (5.26)

where: RGDP = Real Gross Domestic Product ; L = Labour Input ; K = Capital Input and γ measures the extent of returns to scale.

In a neoclassical framework, total factor productivity (TFP) growth is calculated as a residual term, by subtracting the contribution of capital and labour inputs from output growth.TFP growth corresponds to the portion of growth left unaccounted by increases in factor inputs. TFP equation[36] is represented as:

$$\frac{\delta \ln TFP}{\delta t} = \frac{\ln GDP}{\delta t} - \gamma\left[\alpha \frac{\delta lnL}{\delta t} + (1-\alpha)\frac{\delta lnK}{\delta t}\right] \quad (5.27)$$

To this end, this study follow the neoclassical growth accounting framework and use Solow residuals as a measure of total factor productivity.

5.4 New Insight into the Productivity Measurement

This approach entails identifying the taxonomy of factors affecting productivity. A number of factors have been identified in the literature as productivity determinants. Barro and Sala-i-Martin (1999) used panel data for 90 countries to analyze the determinants of productivity. The explanatory variables used include: educational attainment, public spending on education, rule of law, tariff , political instability and inflation rate. The result show that the estimates of educational attainment (proxied by school enrolment rate), public spending on education(proxied by percentage GDP spent on education), rule of law index (law and order) and tariff rate positively influenced productivity while the estimates of political instability and inflation rate influenced productivity negatively.

Chen and Dahlman (2004) aggregated data for 92 countries from 1960-2000 to analyze the determinants of productivity using the same variables explored in Barro and Sala-i-Martin. The results obtained were similar. However, Jamison, Lau and Wang (2003) approached the analysis of the determinants of productivity using a Cobb-Douglas production function involving panel data for 53 countries over the 1965-90 period. The variables employed for the analysis was similar to the

[36]. Take the logarithm of both sides of the equation 5.26 with respect to time yields :

$$\frac{\ln GDP}{\delta t} = \gamma\left[\alpha\frac{\delta \ln L}{\delta t} + (1-\alpha)\frac{\delta \ln K}{\delta t}\right] + \frac{\delta \ln TFP}{\delta t}$$

$$\frac{\delta \ln TFP}{\delta t} = \frac{\ln GDP}{\delta t} - \gamma\left[\alpha\frac{\delta \ln L}{\delta t} + (1-\alpha)\frac{\delta \ln K}{\delta t}\right]$$

one used by Barro and Sala-i-Martin (1999) with the inclusion of openness variable. The inclusion of openness variable to productivity equation was justified by Wong (2006) study for Ecuador, Tybout (1996) for Chile and Haddad et.al (1996) for Morocco. Empirical finding from these studies positively correlates productivity with openness to trade. There was empirical regularity in the findings of all these studies. Some strands of studies have also linked productivity to exchange rate volatilities. Dollar (1992) used PPP based real exchange rate estimates to show that overvaluation of the exchange rate harms productivity. Razin and Collins (1997), Aguirre and Calderon (2006) find that large over and undervaluation of the exchange rate hurt growth. Rapid growths in productivity are often correlated with real exchange rate depreciation. Parallel market exchange rate premium have also featured in the productivity literature as its determinant. Patronizing parallel market exchange may put pressure on the official exchange rate in the market thereby allowing them to depreciate. The parallel market exchange rate premium was reported in Ogun (2012) as proxy for corruption which have policy implication on long run productivity growth.

Recently, national system of innovation, particularly research and development took a prominent role among the factors driving productivity. Literatures converged in opinion on the pivotal role played by national system of innovation in stimulating productivity. A number of studies namely, Szirmai (2005), Fagerberg (2005) and Niosi (2002) included national system of innovation (proxied by the share of GDP on research and development expenditure) among the variables affecting productivity. Empirically, the inclusion of the variable into the productivity determinants yielded a significant increased output. This study departs from the conventional growth accounting method of decomposing total factor productivity from the production function. Motivation for the specification of the productivity equation was derived from the literature evidence reported above. The productivity equation to be estimated was presented in chapter four as equation 4.29.

$$PGRT_T = \gamma_0 + \gamma_1 OPENS_t + \gamma_2 NSI_t + \gamma_3 LAWOR_t + \gamma_4 PARMK_t + \gamma_5 REXR_t + \gamma_6 RIR_t + \gamma_7 COR_t + \varepsilon_t$$

Where:

PGRT = Productivity growth

OPENS = Trade openness

NSI = National system of innovation

LAWOR = Law and order

PARMK = Parallel market exchange rate premium

REXR = Real exchange rate

RIR = Real interest rate

COR = Index of corruption.

The above equation comprised short-run and long-run variables. The short-run variables are PARMK, REXR and RIR while the long-run counterparts are OPENS, NSI, LAWOR and COR. The short- run variables are known to affect productivity growth but their severity and magnitudes can be checked through policy variations. Long run variables are policy variables. As a result, the short run variables are not included in the cointegration analysis. Their influence on productivity growth determines how useful they are in the process of economic growth. It is on the basis of above explanation that this study analyzed the factors influencing productivity growth within the context of Nigerian economy.

5.5 Presentation and Analysis of Empirical Results

The descriptive statistics was carried out on all the variables in equation 4.29 to find out whether they are normally distributed or not. Two approaches was pursued. These include: the probability and chi-square approach. It was found that all the variables in the model (except Parallel Market Exchange Rate Premium, PARMK) passed the normality test particularly when Jarque-Bera value of 7.81 > 5.99. Table 5.1 presents the descriptive statistics. The skewness values for most of the variables are between 0.05 and 1.21, with all variables having positive signs indicating skewness to the right. The kurtosis indicates the peakness or flatness of the data relative to a normal distribution. It shows that the Real Interest Rate (RIR) satisfies this condition with an expected value of 3.07. The probability value of all the variables are high (except PARMK) accepting that the normal distribution for all the variables indicating a normality of their unconditional distributions.

Table. 5.1. Summary Statistics for Productivity Growth

	PGRT	OPENS	NSI	LAWOR	PARMK	REXR	RIR	COR
Mean	1.675891	0.464279	4.996830	3.981071	0.831998	3.926399	0.896461	0.987500
Median	1.792067	0.463774	4.830026	4.094846	0.264579	0.924229	0.666160	0.300000
Maximum	2.884998	0.770697	9.845271	9.149100	3.248690	15.87681	2.727270	2.700000
Minimum	0.598898	0.190796	1.806408	0.266510	-0.019640	0.019316	0.072495	0.100000
Std. Dev.	0.792457	0.143792	2.189783	2.457858	1.145280	4.603766	0.708527	0.970451
Skewness	0.046368	0.064247	0.575848	0.223179	1.207826	0.942876	0.970396	0.708700
Kurtosis	1.598244	2.638850	2.482146	2.042499	2.833379	2.846614	3.071712	1.959492
Jarque-Bera	2.631358	0.195920	2.126099	1.488058	7.817522	4.772787	5.029093	4.122240
Probability	0.268292	0.906685	0.345401	0.475196	0.020065	0.091961	0.080900	0.127311
Sum	53.62850	14.85693	159.8986	127.3943	26.62393	125.6448	28.68675	31.60000
Sum Sq. Dev.	19.46765	0.640965	148.6496	187.2730	40.66169	657.0345	15.56234	29.19500
Observations	31	31	31	31	31	31	31	31

Source: Computed from E-View 7.0

List of Variables

PGRT = Productivity Growth; OPENS = Openness to trade; NSI = National system of innovation; PARMK = Parallel market exchange rate premium; REXR= Real exchange rate; RIR = Real interest rate; COR = Index of Corruption ; LAWOR = Law and Order.

The Pearson's correlation coefficients for the variables in the model is presented in Table 5.2. The result revealed that openness to trade, national system of innovation, law and order, real exchange rate and corruption are positively correlated with productivity. In contrast, parallel market exchange rate premium and real interest rate are negatively correlated with productivity growth. However, the analysis of short-run correlation relationships may be spurious. As a result, a more rigorous analysis must be undertaken to underpin the effect of corruption on productivity growth.

Table 5.2: Correlation Matrix for Productivity

	PGRT	OPENS	NSI	LAWOR	PARMK	REXR	RIR	COR
PGRT	1							
OPENS	0.581	1						
NSI	0.499	0.115	1					
LAWOR	0.036	0.374	-0.246	1				
PARMK	-0.332	-0.066	-0.194	-0.183	1			
REXR	0.706	0.346	0.425	-0.28	-0.508	1		
RIR	-0.126	-0.039	-0.291	-0.301	-0.028	0.337	1	
COR	0.869	0.428	0.64	0.057	-0.417	0.702	-0.1	1

Source: Computed from E-View 7.0

5.6 Stationarity Test for Productivity

The importance of tests for stationarity of variables is rooted on the fact that regression involving non-stationary variables leads to misleading inferences since the estimated coefficients would be biased and inconsistent. When all or some of the variables are not stationary, it is important therefore to carry out appropriate transformation (differencing) to make them stationary. The Dickey Fuller class of tests and the Phillips-Perron unit root tests for stationarity were used to test for variable stationarity. Table 5.3 presents the result of the unit root tests. Akaike information criterion was used to determine the duration of delays in both tests.

Table 5.3: Stationarity Test Results for Productivity Variables

Variable		ADF Statistics	Critical Values		PP Statistics	Critical Values		Order of Integration
			1%	5%		1%	5%	
*PGRT***	Level	-3.3781	-4.2967	-3.5684	-2.9639	-4.2846	-3.5629	I_2
	1st Diff	-3.9886	-4.2967	-3.5684	-3.8001	-4.2967	-3.5684	
	2nd Diff	-5.4411	-4.3240	-3.5806	-14.7754	-4.3098	-3.5742	
*OPENS***	Level	-4.2846	-4.1820	-3.5629	-4.2846	-4.1597	-3.5629	I_0
*NSI***	Level	-1.5844	-4.2967	-3.5684	-2.7157	-4.2846	-3.5629	I_1
	1st Diff	-8.5658	-4.2967	-3.5684	-22.6021	-4.2967	-3.5684	
*LAWOR***	Level	-3.1196	-4.2846	-3.5629	-3.0682	-4.2846	-3.5629	I_1
	1st Diff	-7.3238	-4.2967	-3.5684	-7.2380	-4.2967	-3.5684	
*PARMK***	Level	-3.3954	-4.2967	-3.5684	-2.5302	-4.2846	-3.5629	I_1
	1st Diff	-5.6931	-4.3240	-3.5806	-17.4225	-4.3098	-3.5742	
*REXR***	Level	-2.8649	-4.2846	-3.5629	-2.8056	-4.2846	-3.5629	I_1
	1st Diff	-5.6718	-4.3098	-3.5742	-6.6918	-4.2967	-3.5684	
*RIR***	Level	-3.3880	-4.2846	-3.5629	-3.3377	-4.2846	-3.5629	I_1
	1st Diff	-5.8313	-4.3098	-3.5742	-15.6729	-4.2967	-3.5684	
*COR***	Level	-2.7216	-4.2846	-3.5629	-2.7216	-4.2846	-3.5629	I_1
	1st Diff	-5.3780	-4.3098	-3.5742	-12.2192	-4.2967	-3.5684	

** denote trend and intercept.

Source: Computed from E-View 7.0

From table 5.3, productivity growth was found to be stationary at second difference, openness to trade at levels, while other variables in the model are stationary at first difference. To ascertain the short-run dynamics of productivity growth, it is therefore important to carry out tests for cointegration. It should also be noted that openness to trade (OPENS) variable is conspicuously not among the variables in the cointegration analysis as it was found to be stationary at levels.

5.7 Cointegration test results and Analysis of Productivity

Before proceeding to Johansen test for cointegration, we performed the optimal lag selection for the model. The optimal lag length for the model was found to be one as shown in Table 5.4.

Table 5.4 Criteria for Selecting Lag Length for Productivity

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-4.968	NA	0.131	0.798	1.125	0.902
1	42.211	69.12*	0.006*	-2.281*	-1.907*	-2.161*
2	42.44	0.32	0.006	-2.23	-1.809	-2.2095

***** Indicates lag order selected by the criterion

LR : Sequential modified LR test statistic (each test at 5% level)
FPE : Final prediction error
AIC : Akaike Information Criterion
SC : Schwarz Information Criterion
HQ : Hannan-Quinn Information Criterion
Source : Computed from E-View 7.0

The result of cointegration condition is presented in Table 5.5 using the methodology proposed by Johansen and Juselius (1990). From the table, the trace test indicated one (1) cointegrating equation at 5% level of significance while the maximum eigenvalue statistic indicated no cointegrating equation at the same level of significance. The normalized cointegrating equation pointed to a positive influence of national system of innovation(NSI) and law and order (LAWOR) on productivity growth, with negative correlation between corruption (COR) and productivity growth.

The negative sign on the corruption estimate suggested a drop in the efficiency level of production efforts. Corruption does not only condition an economy's productivity level, it also retarded growth potentials. Law and order (proxied by government expenditure on security) is expected to affect productivity growth positively. If law and order is used as a measure of productivity growth, a country that is subjected to weak law and order would face more uncertainty in productivity outcomes and in the long run affects productivity growth negatively. From the normalized cointegrating equation which show the long run result, the estimate of LAWOR is positive, which implies that public expenditure on security affects productivity growth positively. The short run estimation of productivity growth model (obtained from the parsimonious ECM model, Table 5.7) indicated that LAWOR variable influenced productivity growth negatively, implying that the components of LAWOR variable were underperforming to address the question of productivity in the short run. It therefore implies that in the long run, LAWOR promotes productivity growth.

A number of trade theories on growth[37] have provided intellectual support for the proposition that openness to trade affected economic growth positively. Countries that are more open to the rest of the world have a greater ability to absorb technological advances generated in leading nations. In general, parallel market exchange rate premium, real interest rate and real exchange rate are short run variables which have influence on productivity growth. These variables were not included in the cointegration analysis because shocks on them could be sterilized by policy responses. This study therefore, was built on the premise that corruption affects economic growth through productivity growth channel. Following this, fitted observed productivity

[37]. For more discussion, see the works of Edwards (1993), Rodrik (1995), Grossman and Helpman (1991) and Barro and Sala-I-Martin (1995).

growth was generated from the correctly signed variables in the normalized cointegrating equation of productivity growth estimates. The fitted estimate was included among the variables in the growth equation.

Table 5.5 : Johansen Cointegration Test for Productivity (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Per cent Critical Value	Max-Eigen Statistic	5 per cent Critical Value
None*	0.532	47.866	47.856	22.767	27.584
At most 1	0.381	25.099	29.797	14.396	21.132
At most 2	0.209	10.703	15.495	7.029	14.265
At most 3	0.115	3.674	3.841	3.674	3.841

Note: Trace test indicates 1 cointegrating equation at the 0.05 level, while no cointegrating equation for M
eigenvalue test.
* denotes rejection of the hypothesis at the 0.05 level.

Normalized cointegrating coefficients (standard error in parentheses)

PGRT	NSI	LAWOR	COR
1	0.203	0.016	-1.215
	(-0.059)	(-0.039)	(-0.11)

Source : Computed from E-View 7.0

5.8 Short-run Dynamics of Productivity

The stationarity test results showed that not all the variables in the productivity growth series are stationary at first difference. Observed productivity growth was stationary at second difference while openness to trade was stationary at levels. With this position established, the error correction model was therefore pursued. The error correction term was derived from the long run equation. Table 5.6 showed the result of over parameterized model with all the variables lagged equally.

Table 5.6 : Overparameterized model for Productivity

Dependent Variable: ΔPGRT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005407	0.078163	-0.069181	0.9482
ΔPGRT(-1)	0.290865	0.505210	0.575731	0.5956
ΔPGRT(-2)	0.689960	0.716770	0.962595	0.3903
ΔOPENS	0.349775	0.232501	1.504401	0.2069
ΔOPENS(-1)	-0.032893	0.331865	-0.099115	0.9258
ΔOPENS(-2)	-0.245488	0.251635	-0.975572	0.3845
ΔNSI	-0.020456	0.033529	-0.610116	0.5747
ΔNSI(-1)	0.005328	0.027007	0.197266	0.8532
ΔNSI(-2)	-0.025212	0.018455	-1.366154	0.2437
ΔLAWOR	-0.003706	0.017797	-0.208222	0.8452
ΔLAWOR(-1)	-0.011006	0.016958	-0.649023	0.5517
ΔLAWOR(-2)	-0.009805	0.016020	-0.612051	0.5736
ΔPARMK	-0.054631	0.054190	-1.008145	0.3704
ΔPARMK(-1)	0.062783	0.041487	1.513325	0.2048
ΔPARMK(-2)	-0.042557	0.065489	-0.649838	0.5512
ΔREXR	0.023249	0.031595	0.735845	0.5026
ΔREXR(-1)	-0.017413	0.016733	-1.040626	0.3568
ΔREXR(-2)	0.016369	0.026637	0.614518	0.5721
ΔRIR	-0.098326	0.087409	-1.124888	0.3236
ΔRIR(-1)	-0.053790	0.076487	-0.703262	0.5207
ΔRIR(-2)	-0.046474	0.072212	-0.643587	0.5549
ΔCOR	0.015150	0.105174	0.144042	0.8924
ΔCOR(-1)	-0.195912	0.128285	-1.527161	0.2014
ΔCOR(-2)	0.201978	0.140197	1.440672	0.2231
ECM(-1)	-0.042473	0.155105	-0.273834	0.7978
R-squared	0.899687	Mean dependent var		0.078442
Adjusted R-squared	0.297810	S.D. dependent var		0.078488

S.E. of regression	0.065770	Akaike info criterion	-2.862154
Sum squared resid	0.017303	Schwarz criterion	-1.683451
Log likelihood	66.50124	Hannan-Quinn criter.	-2.492999
F-statistic	1.494803	Durbin-Watson stat	2.000195
Prob(F-statistic)	0.380186		

Source: Computed from E-View 7.0 by the Researcher.

As shown in the parsimonious ECM result of table 5.7, the coefficient of openness to trade is statistically significant and positively correlated with observed productivity growth. It implied that productivity grew faster in more open economies than closed economies. Openness improved the allocative efficiency of the economy. As trade becomes more open, the country specializes in the production of the good in which it has a comparative labour-productivity advantage. This result supported the empirical findings which relate openness to trade positively with productivity growth (Barro and Sala-i-Martin 1999; Wong 2006; and Tybout 1996). Openness to trade in lagged two period influenced productivity growth negatively. The slope coefficient of law and order in lagged one and two periods are however negative in the estimate. This implied that government expenditure on security in Nigeria does not influence productivity growth.

Table 5.7 : The Parsimonious Error Correction Model of Productivity

Dependent Variable: ΔPGRT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔPGRT(-2)	0.884794	0.125681	7.040005	0.0000
ΔOPENS	0.346214	0.079870	4.334696	0.0015
ΔOPENS(-2)	-0.317466	0.084492	-3.757367	0.0037
ΔNSI	-0.022391	0.015101	-1.482770	0.1690
ΔNSI(-2)	-0.031557	0.010045	-3.141577	0.0105
ΔLAWOR(-1)	-0.015046	0.005371	-2.801257	0.0188
ΔLAWOR(-2)	-0.013440	0.006994	-1.921740	0.0836
ΔPARMK	-0.069037	0.022049	-3.131067	0.0107
ΔPARMK(-1)	-0.072394	0.022302	-3.246062	0.0088
ΔPARMK(-2)	-0.050621	0.024479	-2.067945	0.0655
ΔREXR	-0.023453	0.009896	-2.369960	0.0393
ΔREXR(-1)	-0.020820	0.010805	-1.926938	0.0829
ΔREXR(-2)	-0.019553	0.006775	-2.886006	0.0162
ΔRIR	-0.102959	0.026896	-3.828083	0.0033
ΔRIR(-1)	-0.065099	0.026014	-2.502444	0.0313
ΔRIR(-2)	-0.070053	0.025984	-2.696042	0.0225
ΔCOR(-1)	-0.198007	0.052184	-3.794437	0.0035
ΔCOR(-2)	0.213056	0.081060	2.628372	0.0252
ECM(-1)	-0.023413	0.032895	-0.711739	0.0493

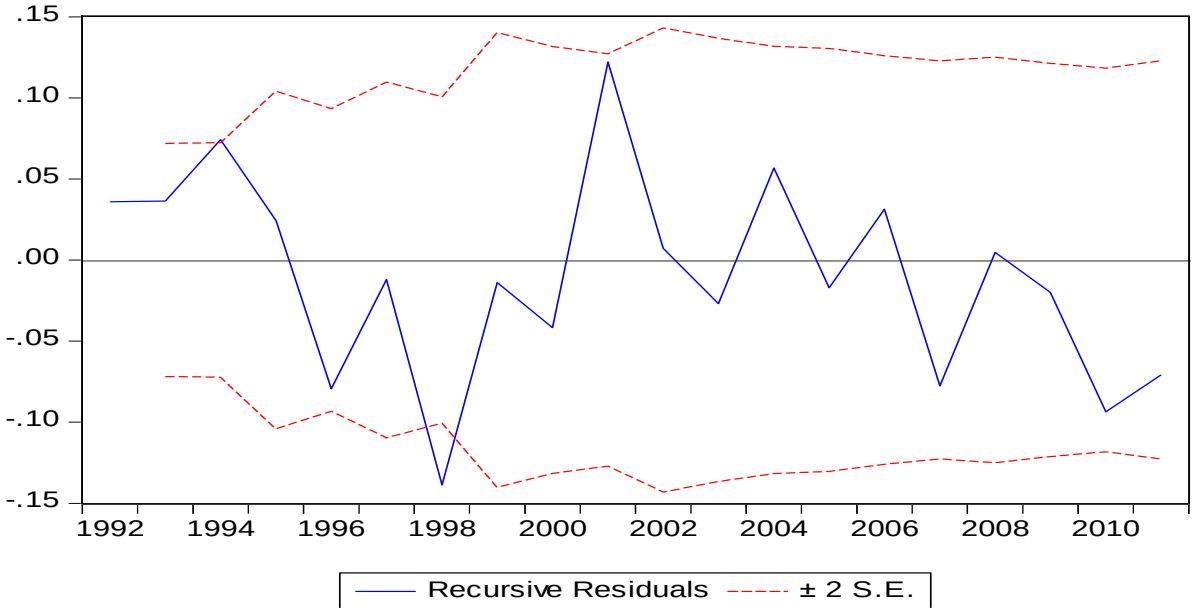
R-squared	0.879207	Mean dependent var	0.078442
Adjusted R-squared	0.661779	S.D. dependent var	0.078488
S.E. of regression	0.045646	Akaike info criterion	-3.090162
Sum squared resid	0.020836	Schwarz criterion	-2.194347
Log likelihood	63.80735	Hannan-Quinn criter.	-2.809604
Durbin-Watson stat	1.597700		

Source: Computed from E-View 7.0 by the Researcher.

The national system of innovation which many studies have proven to drive productivity growth yielded negative values. This result however, is not consistent with the findings from the studies conducted by Szirmai (2005), Fagerberg (2005) and Niosi (2002), which related progress in productivity growth to innovation system. The slope coefficients of corruption in lagged one period was however significant but showed the expected negative sign, implying that corruption correlated negatively with productivity growth. The slope coefficients of parallel market exchange rate premium, real exchange rate and real interest rates are significant and negatively correlated with productivity growth. The ECM (-1) was found to be negative and it showed the eliminating speed of disequilibrium, which accounted about 2.34%. The result obtained in this study was not all that different from what was obtained in other studies reported in the literatures which related corruption and productivity growth negatively.

5.9 Stability Analysis for Productivity

For stability of the productivity growth model, it is expected that the recursive residual (Figure 5.1) stayed within 5% critical bound. In the recursive residual, the residual went outside the ± 2 standard error in 1998, showing an instability. This period corresponded to the period of massive decline in aggregate productivity due to low capacity utilization rate and corrupt practices. The average capacity utilization rate in Nigeria peaked at 75.4% in 1975-1979. It declined persistently from 59.9% to 40.7% and 31.8% during 1980-1984, 1990-1994 and 1995-1999. During the same period, productivity growth declined sharply from 10% to 3% and 2% respectively.



Source: Drawn with data from Central Bank of Nigeria(CBN) Statistical Bulletin(2012).

Figure 5.1 : Recursive Residual for Productivity

5.10 Model Appraisal and Validity for Productivity

All the diagnostic tests statistics conducted are quite satisfactory. The magnitude of the coefficients confirms absence of redundant regressors. Considering from the significance of the t-statistics, the coefficients are well determined. The disequilibrium error term is statistically significant and negative as expected. The significance of the error term in all the equations confirmed the existence of long run relationship between the variables in the error correction models. We can therefore concluded that the regression coefficients are significantly different from zero.

Some residual tests were conducted to ascertained the robustness of the estimated results. The residual serial correlation LM tests and the residual normality tests are presented in Tables 5.8 and 5.9 respectively. The residual correlation matrix was shown to buttress the result from the LM test in table 5.9. The table showed clearly that there was no residual autocorrelation in the model. The LM test corroborated this conclusion. The residual normality test was computed using the skewness, kurtosis and Jaque-Bera statistics with Cholesky (Lutkepohl) Orthogonalization. A clear result from this exercise was that the residuals are normally distributed.

Table 5.8: Residual Serial Correlation LM Tests for Productivity

Null Hypothesis: no serial correlation at lag order h
Sample: 1980 2011

Lags	LM-Stat	Prob
1	1.423269	0.2329
2	1.203923	0.2725
3	1.662245	0.1973
4	0.326188	0.5679
5	4.343936	0.0371
6	0.287277	0.5920
7	0.274421	0.6004
8	0.965466	0.3258
9	0.096648	0.7559
10	0.145828	0.7026
11	0.147837	0.7006
12	0.222138	0.6374

Probs from chi-square with 1 df.
Source: Computed from E-View 7.0 by the Researcher.

Table 5.9: Residual Normality Test for Productivity

Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal

Component	Skewness	Chi-sq	Df	Prob.
1	0.146409	0.103606	1	0.7475
Joint		0.103606	1	0.7475
Component	Kurtosis	Chi-sq	Df	Prob.
1	2.260414	0.660943	1	0.4162
Joint		0.660943	1	0.4162
Component	Jarque-Bera	Df	Prob.	
1	0.764549	2	0.6823	
Joint	0.764549	2	0.6823	

Source: Computed from E-View 7.0 by the Researcher.

CHAPTER SIX

GROWTH ANALYSIS

6.1 Introduction

This chapter attempted to explain a number of growth models that are relevant for the construction of growth model specified in this section. Empirical results were also presented, beginning with the time series properties of the variables used for the estimation. Four sets of empirical results are presented. The first results explained the summary statistics of the variables used in the regression exercise while the second results showed the unit root tests. The third results presented the co-integration tests among the variables used in the model. Finally the fourth results analyzed the error correction model. This study used E-views version 7.0 statistical software to analyze the data.

6.2 Analysis of Growth Models

6.2.1 Classical Growth Models

(a) Adam Smith Model

Adam Smith believed that the economy works like a self regulating system, so that state intervention in the economy will hamper the natural process of the economy. He grouped the labourers as productive and unproductive workers. The productive workers *N* are employed in the production sector (e.g. agriculture, manufacturing and handicraft) and produce a revenue (profit and rent). The unproductive workers are mainly in the service sector (e.g. officials, professors, politicians, actors and servants) and are maintained by the revenue produced in production sector. The capital consists of fixed capital and circulating capital. Circulating capital includes:

a. Wage costs of the productive workers $W = wN$, where w is the wage rate, N is the amount of workers;

b. Raw material consumption mN, where m is the raw material consumption per worker. Fixed capital: kN, where k is the fixed capital endowment per productive worker. The fixed capital consists of machines, tools, buildings (e.g. factories) etc. Adam Smith also seems to count the human capital and money to fixed capital. Thus, the total capital is:

$$K = (m + w + k)\, N. \qquad (6.1)$$

The gross income (or gross product) is:

$$Q_G = Q + Int \qquad (6.2)$$

where Q is the national product and Int is the intermediate product. Note the wage costs of the productive workers wN, the intermediate products Int and part of the fixed capital $dK = dkN$ will gradually expend in the production process (d is the depreciation rate of the capital).

The net income (or net product) is:

$$Q_N = Q_G - (w + m + dk)N = Q_G - cN \qquad (6.3)$$

where cN represents the value of the goods consumed (used up) per worker in the production process. This is the productive consumption of Marx and the Classics.

Thus the net product is

$$Q_N = P + R \qquad (6.4)$$

where P is the profit and R is the rent. The net income is the sum of profits and rents.

The growth model can be derived from the basic equation:

$$Q_G = A\,(k)\,N \qquad (6.5)$$

where A is labour productivity, depending on the capital endowment per worker, k. The output depends on labour productivity and on the amount of labour. If we combine the equation (6.3) and (6.5), we get the equation of net output:

$$Q_N = Q_G - c\,N = [A\,(k) - c]\,N \qquad (6.6)$$

A certain part of the net product is saved and invested:

$$I = \Delta K = s\,[A\,(k) - c]\,N \qquad (6.7)$$

Where s is the savings rate. Savings determine investment and put the economy in motion.

However, the non-saved part of net income $(1\text{-}s)[A(k) - c]\,N$ is used for luxury consumption and for the establishment of an institutional superstructure.

Let us divide both sides of the equation by the capital stock $K = (m + w + k)\,N$. We get the growth rate of the capital stock as well as the rate of growth of the national product, i.e. the wealth of a nation:

$$(I/K) = (\Delta K/K) = g_k = \{s[A(k) - c]N\}/\,(k + w + m)N = \{s[A(k) - c]\}/\,(k + w + m) \qquad (6.8)$$

On the basis of these essential elements of Adam Smith's growth model we may conclude:

• The most important element is the relationship between growth and income distribution: A lower wage rate *w* leads to a higher net product per worker: *A (k)* - *c* rises; at the same time the expenditure for wages is falling (*w* is falling). Both factors increase the rate of growth g_K.

• A high growth rate g_K implies extensive investments that cause an increase of capital endowment per worker (*k*). A rising *k* increases the labour productivity *A*, which in turn increases the rate of growth g_K. This leads to a cumulative process of growth.

• Finally, the growth rate of economy is higher, the larger is the fraction *s* saved out of the net income. In contrast to the Mercantilists and Keynes, saving is a virtue for Adam Smith. Hence he dislikes luxury consumption and excessive government spending. Given this, Adam Smith's growth model is entirely supply-sided. Demand factors do not play any role.

(b) Malthusian Growth Model

Malthusian model relies on two key ingredients: an agricultural production function that uses the fixed factor land, and an income-population feedback where the population growth rate is an increasing function of income per capita. Consider an aggregate production function of the form:

$Y_t = (A_t X)^{\alpha} N_t^{1-\alpha}$ (6.9)

where Y_t denotes output in period *t*, A_t is productivity, *X* is the fixed amount of land, and N_t is the size of the population. Dividing (6.9) by N_t on both sides, we can see that income per capita $y_t = Y_t/N_t$ is given by:

$y_t = (A_t X/N_t)^{\alpha}$ (6.10)

The equation implies that income per capita is an increasing function of productivity, but a decreasing function of population: when the size of the population increases, there is less land for each person to work with, which lowers income per capita. To develop a theory of stagnation based on this production function, we need to specify how productivity and population evolve over time. As in the Solow model, we will assume that productivity A_t grows at the constant rate *g*, so that:

$A_{t+1} = (1 + g)A_t$:

Population growth, in turn, is assumed to be an increasing function of income per capita y_t:

$(N_{t+1} - N_t)/N_t = f(y_t)$ (6.11)

where $f'(.) > 0$. A number of different justifications can be given for this relationship. One possibility is that children enter the utility function of parents as normal goods. A rise in

income would then increase the demand for children, leading to higher population growth. Alternatively, the mechanism could also work through mortality. If higher income leads to better nutrition and, as a consequence, lower mortality rates, a positive relationship between income per capita and population growth follows. As an empirical matter, the assumption of a positive relationship appears to fit the experience of most pre-industrial economies rather well. For concreteness, we can now specify population growths in a framework in which parents optimally choose their fertility, and children are a normal good. In other words, when income goes up, more children are "consumed" by the parents. It is also assumed that parents have children for their enjoyment only. Consider a utility function over consumption c_t and number of children n_t of the form:

$u(c_t; n_t) = \ln(c_t) + \ln(n_t)$:

The parent has income y_t, and the cost of raising a child in terms of goods is p.

The budget constraint is then:

$c_t + pn_t = w_t$:

By substituting for consumption, we can write the utility maximization problem as:

$\max(n_t) \{\ln(y_t - pn_t) + \ln(n_t)\}$

The first order condition with respect to n_t is:

$0 = - \{p/(y_t - pn_t)\} + (1/n_t)$ which yields:

$nt = (yt/2p)$ (6.12)

Thus the higher the wage, the more children are going to be produced. If we assume that people live for one period, the number of children per adult n_t determines population in the next period N_{t+1}:

$N_{t+1} = n_t N_t = (y_t/2p)\, N_t$: (6.13)

That is, the population tomorrow equals population today times number of children per person. Now that income per capita y_t as well as the laws of motion for productivity and population are exactly specified, we can derive the long-run behaviour of our economy. Plugging income per capita y_t into the law of motion for population (6.13) yields:

$N_{t+1} = (0.5p)(A_t X)^{\alpha} N_t^{1-\alpha}$

The qualitative properties of this law of motion for population are similar to those of the law of motion for capital in the Solow model. Most importantly, the law of motion has the convergence property in the sense that population growth is higher when population is low:

$(N_{t+1})/(N_t) = (0.5p)(A_tX/N_t)^{\alpha}$

That is, if A_t were fixed and constant over time, the population would converge to a fixed level, regardless of the initial condition. If A_t is growing, i.e., $g > 0$, we can redefine variables such that the modified law of motion reaches a steady state. Define m_t as the ratio of population to the product of A_t and X:

$m_t = (N_t/A_tX)$

The term A_tX is referred to as effective land units. The variable m_t is a measure of population density, but rather than simply taking the ratio of population and land (i.e., people per square mile), land is weighted by its productive capacity. Rewriting the law of motion by substituting $N_t = A_tXm_t$ and $N_{t+1} = A_{t+1}Xm_{t+1}$ gives:

$A_{t+1}Xm_{t+1} = (0.5p)(A_tX)^{\alpha} (A_tXm_t)^{1-\alpha}$

Since we have $A_{t+1} = (1 + g)A_t$, this can be written as:

$(1 + g)A_tXm_{t+1} = (0.5p)A_tXmt^{1-\alpha}$

Dividing by A_tX and $1 + g$ on both sides gives:

$m_{t+1} = \{1/(1 + g)2p\}\{m_t^{1-\alpha}\}$

This law of motion depends on m_t only, and since we have $1-\alpha < 1$, m_t converges to a steady state from any initial condition. The steady state ratio $\bar{m}$ of population to effective land units has to satisfy:

$\bar{m} = \{1/(1 + g)2p\} (\bar{m})^{1-\alpha}$

which gives:

$(\bar{m})^{\alpha} = (1 + g)2p$

or:

$\bar{m} = \{(\bar{m})^{\alpha}\}^{(1/\alpha)}$

Thus, in the long run, the ratio $m_t = N_t = (A_tX)$ of population to effective land units is constant. This implies that in the steady state, population and productivity have to grow at the same rate; the long-run population growth rate is therefore $1 + g$, i.e., fertility $\bar{n}$ in the steady state satisfies $\bar{n} = 1 + g$.

Specifically, we found that population growth depends negatively on initial population. This implies that population growth should be expected to rise after a sudden decrease in population, for example because of an epidemic or a war. This prediction is in line with historical observations, for example, the fast recovery of European population after the Black

Death. The theory also implies that population growth and therefore density will be higher in countries or areas where productivity growth g is high.

(c) David Ricardo Model

Ricardo's growth model is based on the following assumptions:

• The wage costs for direct and indirect labour W are equal to the capital K invested: $W = K$.

• The profits will be completely invested: $P = I$.

• The investments are equal to an expansion of the capital stock: $I = \Delta K$.

Thus, the profit rate is equal to the growth rate of the system:

$$r = P/W = P/K = I/K = \Delta K/K = g_K. \quad (6.14)$$

Profits finance investments, and the growth rate of the capital stock determines the growth rate of the national product. The relationship between profit rate and growth rate is a fundamental feature of classical political economy. David Ricardo expressed Say's Law in a different way: excessive saving would not reduce demand for home products, a general overproduction is impossible, in other words, each supply creates its own demand; money serves only as an instrument to facilitate production and exchange, but doesn't have any influence on the real economic sector, that is, money will not be held, because holding money doesn't yield profits. Hence income will be either consumed or saved and invested. Both Say and Ricardo admitted that innovations can destroy jobs in the short run, whereas Say pointed out that the new technology created jobs in the long run and Ricardo argued that "the discovery and use of machinery ... will be injurious to the labouring class, as some of their number will be thrown out of employment, and population will become redundant, compared with the funds which are to employ it" , but Ricardo also believed that in the long run technical progress would eventually set the economy on a course of expansion. The adaptation of the products to the consumption preference is more important for the economic growth than enough production in each sector in general.

In the view of Ricardo, wages are regulated by the increase of capital. "In the natural advance of society, the wages of labour will have a tendency to fall, as far as they are regulated by supply and demand; for the supply of labourers will continue to increase at the same rate, whilst the demand for them will increase at a slower rate [and such a tendency continues] until the capital became stationary, when wages also would become stationary, and be only sufficient to keep up the numbers of the actual population". The labour growth rate is taken to

be constant in Ricardo's model. However, there is, besides the market price for labour, also a "natural price of labour [the natural wage rate] which is necessary to enable the labourers, one with another, to subsist and to perpetuate their race, without either increase or diminution.

As entrepreneurs invest their profits in the production sector, the national product, population and labour supply increase. More and more labours will be employed in agricultural sector in order to feed the rising population. Consequently, more and more bad land has to be cultivated. Thus marginal and average earnings are falling off until the so-called stationary state is reached. "In a stationary state of society … there is neither increased nor diminished facility of producing corn … in such a state, corn will be at an invariable price and the tax will be also invariable". The stationary state of capital and population is inevitable and characterized by:

1. $w = w^*$, i.e. the natural wage rate is in accordance with the minimum living wage (because of population pressures). In the stationary state, the change of wages is regulated wholly by the change of the population.

2. Ricardo defined rent as "that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil". Land is not unlimited in quantity and uniform in quality, and with the progress of population, land of an inferior quality has to be cultivated, thus the rent will be paid for the use of it. When the land of the second degree of fertility or even third degree of fertility is taken into cultivation, the rent of the first quality land will rise, for it must always be above the rent of the second, by the difference between their productive powers with a given quantity of capital and labour. There must be a very high proportion of rent income. Therefore the income distribution is extremely unequal. This implies: only a few people could be rich, mostly landowners, while the largest proportion of the population lives in poverty.

3. Positive rate of profit induces the capitalists to accumulate capital. With the capital accumulation, the labour force grows. Then both marginal product of capital/labour and the rate of profit will fall until the stationary state is reached and profit rate is zero, which means that there is no more investment and no more growth.

"Interest is regulated chiefly by the profits that may be made by the use of capital ... A low rate of interest is a symptom of a great accumulation of capital; but it is also a symptom of a low rate of profits, and of an advancement to a stationary state; at which the wealth and resources of a country will not admit of increase" (Ricardo, 1821b, p. 474).

6.2.2 Neoclassical Growth Model

As starting point, we assume a production function of the form:

$Qt = f(K_t, L_t)$ (6.15)

Where Q = output produced by the factors, labour (L) and capital, K and t denotes time. The critical assumption of the production function is that it shows constant return to scale. Technically, the neoclassical production function is homogenous of degree one and implies that both factors must be available, or else output would equal zero (i.e. the economy would not exist). The function allows for an unlimited substitutability between capital and labour, which means that to produce any given output, any account of capital can be efficiently used with the appropriate amount of labour. As a consequence of this assumption, the capital-output ratio can take on any non negative value. Equation (6.15) exhibits positive and diminishing marginal products (quasi-concave) with

$f(0) = 0, f^1(.), f^{11}(.) < 0$. The factors of production grow at constant rates:

$$\dot{L}_t = nLt \quad (6.16)$$

$$\dot{K}_t = sKf(K_t, L_t) \quad (6.17)$$

Where a dot over a variable denote a derivative with respect to time, and the labour force growth rate n as well as the saving rate s_k are exogenous parameters. Equation (6.16) implies that $L_t = Lo\, e^{nt}$, and can be looked at as a supply curve of labour, with the labour force growing at an exponential and completely inelastic rate. Since L_t denotes both labour supply as well as total employment in equation (6.17), the model implies that full employment is perpetually maintained. Under the conditions of full employment and inelastic supply of both labour and capital at any point in time, both factors earn their marginal product, where the real wage v and the real interest rate r are given by:

$$V_t = \frac{\partial Q_t}{\partial L_t} \quad (6.18)$$

$$V_t = \frac{\partial Q_t}{\partial K_t} \quad (6.19)$$

where the price level is assumed to be constant. By definition, output equals income. From equations (6.15), (6.18) and (6.19), we have: which is the sum of wages and profit.

The capital labour ratio K_t is defines as :

$$K_t = \frac{K_t}{L_t} \quad (6.20)$$

The derivative of Equation (6.20) (with no depreciation) with respect to time is

$$K_t = \frac{\dot{K}_t L_t - K_t \dot{L}_t}{L^2 t} = \frac{\dot{K}_t}{L_t} - nK_t \quad (6.21)$$

Since the production function is homogenous of degree one, output per labour unit q_t can be expressed as:

$$q_t = f(K_t) \quad (6.22)$$

where $f(K_t) \geq 0$ for $K_t \geq 0$. It also exhibits positive and admonishing marginal products with $f(0) = 0$, $f^1(0) > 0$, $f^{11}(.) < 0$.

From equations (6.17), (6.22) and (6.23), it follows that physical capital equipment per labour unit grows at:

$$\dot{K}_t = \frac{SK\, f(K_t, L_t)}{L_t} - nK_t = SK\, f(K_t) - nK_t \quad (6.23)$$

The first term, S_k $f(K_t)$, displays the increment of capital, and represents actual investment per labour unit; the second term, nK_t, accounts for the increase of labour and as such represents the break – even investment necessary to keep K at its existing level. When $\dot{K} = 0$, the capital – labour ratio is constant, and consequently the aggregate capital stock (K) must be expanding at the same rate as the labour force n. If this is the case, the system is in equilibrium and is defined as being in or state of balanced growth.

6.2.3 Exogenous Models

(a) Robert Solow model

The exogenous growth model is also known as Solow growth model. In Solow's model, there are two factors of production: capital and labour. Technology is exogenous and represented by a production function:

$$Y = F(K,L) \quad (6.24)$$

where *Y* is output or income, *F* the function of technology, *K* capital input, and *L* labour input. Output is to be understood as net output (i.e. gross output minus the depreciation of capital). Part of the output is consumed and the rest is saved and invested.

$$\Delta K = sY \quad (6.25)$$

where *s* is the saving rate. This equation shows that the net investment is equivalent to the increase of the capital stock and what is saved will be invested. Inserting (6.25) in (6.24), we get:

$\Delta K = sF(K,L)$. (6.26)

This means, the net investment depends on saving rate, technological level, capital and labour supply. Like Adam Smith, Solow stresses the importance of savings and capital formation for economic development. Solow allowed changes in wage and interest rates, substitutions of labour and capital for each other, variable factor proportions, and flexible factor prices.

Technological progress is introduced into the model in a very simple way. For simplicity, we can assume the production function as

$Q = A(t)f(K,L)$ (6.27)

where Q is the aggregate output (GDP), $A(t)$ a function of time that allows for neutral technological change, $f(K,L)$ a function of capital and labour. By differentiating this function, we get the growth rate of the GDP:

$g_q = g_a + w_k g_k + w_l g_l$ (6.28)

where $g_q = Q/Q$, $g.Q_a = A/A$, $g_k = .K/K$ and $g_l = L/L$ are the growth rates of the output, technology, capital stock and labour respectively; $w.L_k = (\delta Q/\delta K)(K/Q)$ and $w_l = (\delta Q/\delta L)(L/Q)$ are the production elasticities of capital and labour which are equivalent to the relative shares of the capital and labour in GDP. Thus, to raise an economy's long term trend rate of growth requires an increase in the labour supply and a higher level of productivity.

A sustained increase in capital investment increases the growth rate only temporarily: the capital/labour ratio goes up (i.e., more capital will be available for each worker to use), but the marginal product of additional units of capital will decline (diminishing returns to capital). A "steady-state growth path" is reached when output, capital and labour are all growing at the same rate, so output per worker and capital per worker are constant.

In the Solow model, the economy tends to converge along the growth path. Given constant growth rates for technology and labour input, all variations in output growth are due to variations in the growth rate of capital input. For output growth to be constant, capital growth must also be constant. The growth rates for capital and output must be the same so that capital-output ratio would also be constant along a constant growth. The growth rate of the capital

stock depends negatively on the capital-output ratio. Therefore, for the capital stock to be growing at a constant rate, then capital-output ratio must be constant .But capital-output ratio can only be constant if the growth rate of capital stock is the same as the growth rate of output. In the steady state, only the growth rate of technology and the factor controlling the extent of diminishing marginal returns to capital can affect the growth rate of output per worker.

(b) Keynesian Growth Model: Roy Harrod

The Harrod growth model based on the traditional proposition that saving in a period equals investment, i.e. the addition to the capital stock. Let v^* stand for the value of capital required for the production of one additional unit of output (capital coefficient) and s stand for the average saving rate. The total saving is sQ_0, the addition to the capital stock is $v^*(Q_1 - Q_0)$.

$$sQ_0 = v^*(Q_1 - Q_0) = I^*. \quad (6.29)$$

Therefore: $s/v^* = (Q_1 - Q_0)/Q_0 = g^*$ (6.30)

where g^* is the Harrod's warranted rate of growth. "The warranted rate of growth is taken to be that rate of growth which, if it occurs, will leave all parties satisfied that they have produced neither more nor less than the right amount" (Harrod 1939). But this warranted rate of growth is not stable and the economic system is completely unstable, because the "rationality" of the system is different from the "rationality" of individual producers. This can be explained most conveniently by the income effect of investment and by the capacity effect of investment as have been derived by Domar(1966):

The income effect of investment is based on the Keynesian multiplier:

$$\Delta Y = Y_1 - Y_0 = (I/s)(I_1 - I_0) = (I/s)\,\Delta I^* \quad (6.31)$$

and the capacity effect of investment is associated to the accelerator principle:

$$\Delta Q = Q_1 - Q_0 = (1/v^*)I_0 \quad (6.32)$$

where $1/v^*$ is the technically given output/capital ratio . The income effect of investment tells that more investment induces more income and profit, whereas the capacity effect of investment implies that the rising output depends on the capital productivity and upon the investment volume. The relationship between investment and profit represents the income effect of investment which interacts with the capacity effect of investment to produce the business cycle. In the short term only the income effect of investment is relevant, since capacities are given. As a matter of fact, the effective demand Y reacts on the change of the

investment much more strongly than the output Q. In other words, the income effect of investment is much stronger than the capacity effect at the beginning period, i.e. ($1/s$) is much bigger than ($1/v^*$). With high investment volumes the capacity effect of investment will gradually work out ever stronger. On the basis of the income effect of investment the system links higher volumes of investment with higher profits and incomes which, on the behavioural side, induces entrepreneurs to invest more; this upward movement is reversed as soon as the capacity effect of investment works out and entrepreneurs invest less to avoid underutilization of productive capacities.

Hence we have the Harrod Paradox which implies the instability of the system:

If the realized growth rate g falls below the warranted rate g^*, and then $\Delta Q > \Delta Y$, that is to say, the additional effective demand is not high enough to absorb the additional supply. The reason is that the entrepreneurs have not invested enough to create sufficient effective demand which can absorb the additional supply. But the entrepreneurs could think that they have invested too much, because the effective demand falls short of output. Consequently, entrepreneurs will reduce investment which means that the gap between g^* and g widens even more. On the other hand, if realized growth rate g is greater than the warranted rate g^*, we have $v < v^*$, i.e. stocks are run down, the output is not enough to satisfy the increased demand because the entrepreneurs have invested too much and created too much effective demand. But they think that they have not invested enough and must invest even more since the demand is greater than the supply. As they invest more, again the gap between g and g^* will widen.

The instability of the system is reduced if there are autonomous investments. Such autonomous investments may have no direct relation to the current increase of output. They may be related to a possible long period increase of activity. Or they may be induced by new inventions calculated to reduce production cost or change consumers' modes of spending their income. Then the equation becomes:

$$I = a\,Q + v^*\,\Delta Q = s\,Q. \qquad (6.33)$$

The modified warranted rate of growth is:

$$g^* = \Delta Q^*/Q = \Delta I^*/I_0 = (s - a)/v^* \qquad (6.34)$$

where this v^* now stands not for the total increase of capital per additional unit of output, but only for the net increase of capital after the capital has been subtracted. The warranted rate of growth g^* is reduced once autonomous expenditures are introduced, implying that the

economic system becomes more stable. Temporarily, less investment and output growth is required to set an economy on a cumulative growth path in the direction of full employment.

6.3 Presentation and Analysis of Empirical Results for Growth

Table 6.1 shows the characteristics and summary statistics of the variables used in the model. The skewness values for most of the variables are nearly zero with two having negative signs indicating skewness to the left while the other two with positive signs are skewed to the right. The kurtosis indicates the peakness or flatness of the data relative to a normal distribution. It shows that the tastes of consumers (TRGD) satisfies this condition with an expected value of 2.4.

Variables are required to have normal distribution before they are used in any parametric statistical method. Skewness and kurtosis give indications as to the nature of distribution of variables. Skewness is a measure of symmetry or lack of symmetry. The skewness for a normal distribution is zero and any symmetric data should have skewness near zero. The probability value of all variables are high, accepting that the normal distribution for all the variables indicating a normality of their unconditional distributions. The Jarque-Bera (JB) test is used to check hypothesis about the fact that a given sample is a sample of normal random variable with unknown mean and dispersion. JB test has the null hypothesis of normal residuals hence; its rejection requires low probability that is the probability that a Jarque-Bera statistic exceeds the observed value. The mean to median ratio of each variable is within the unit proximity and standard deviations are on the low side showing small variability.

Given the time coverage of the study (1980-2011), and the frequency of the data, all the variables have 31 observations each. From the Table 6.1, real GDP growth averaged 1.86. It ranges from 0.18 to 3.27 with a standard deviation of 1.05. Fitted Productivity growth (PGRTST) has a mean of 1.68. It varies from a minimum of 0.73 to a maximum of 2.99 with a standard deviation of 0.72. Capital expenditure (GE) and Tastes of consumers (TRGD) averaged 1.93 and 1.56 with standard deviation values of 0.86 and 0.49 respectively. The standard deviation reflected the dispersion of the variables around the mean.

Table 6.1 : Summary Statistics for Growth

	RGDP	PGRTST	GE	TRGD
Mean	1.860	1.676	1.926	1.564
Median	1.762	1.592	2.206	1.461
Maximum	3.267	2.985	3.192	2.587
Minimum	0.178	0.732	0.613	0.762
Std. Dev.	1.052	0.720	0.860	0.485
Skewness	-0.077	0.381	-0.190	0.443
Kurtosis	1.464	1.765	1.523	2.428
Jarque-Bera	3.179	2.806	3.102	1.485
Probability	0.204	0.246	0.212	0.476
Sum	59.528	53.629	61.621	50.054
Sum Sq. Dev.	34.313	16.065	22.934	7.297
Observations	31	31	31	31

Source: Computed from E-View 7.0

List of Variables: RGDP = Real gross domestic product growth; PGRTST = Fitted Observed Productivity growth ;GE = Government Capital Expenditure; TRGD = Taste of Consumers.

Following this, the Pearson correlation matrix for the variables in the model is displayed in Table 6.2, with fitted observed productivity growth, capital expenditure and consumers' tastes having positive correlation with economic growth.

Table 6.2: Correlation Matrix for Growth

	RGDP	PGRTST	GE	TRGD
RGDP	1			
PGRTST	0.927	1		
GE	0.951	0.902	1	
TRGD	0.392	0.28	0.311	1

Source: Computed from E-View 7.0

6.4 Stationarity Tests for Growth

Having established the statistical properties of the series, we proceeded to the next step to determine whether the series possess unit roots or not. It is important to check the time series properties of variables used in econometric modelling. It is by ascertaining the data generating process of the variables that the best way of modelling their relationships can be identified. If the variables are stationary in levels, it is best to use OLS linear model to determine their relationship. However, if the variables are integrated, a stationarity model cannot be estimated. Rather, the relationship between the variables is better modelled via cointegration and error correction technique. This entails determining whether the variables are cointegrated, thus having an error correction representation. Stationarity of the time series economic variables in the model was established using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. The results of the ADF and PP tests are reported in Table 6.3. All the variables were found to be nonstationary in levels but stationary after differencing them once.

Table 6.3: Unit Root Tests for Growth

Variable		ADF Statistics	Critical Values		PP Statistics	Critical Values		Order of Integration
			1%	5%		1%	5%	
RGDP**	Level	-3.3181	-4.2967	-3.5684	-3.4341	-4.2846	-3.5629	I_1
	1st Diff	-5.5723	-4.3098	-3.5742	-10.7459	-4.2967	-3.5684	
PGRTST**	Level	-3.1137	-4.2846	-3.5629	-3.0405	-4.2846	-3.5629	I_1
	1st Diff	-5.4016	-4.3098	-3.5742	-7.6815	-4.2967	-3.5684	
GE**	Level	-2.5222	-4.2846	-3.5629	-2.7487	-4.2846	-3.5629	I_1
	1st Diff	-5.8087	-4.2967	-3.5684	-5.7852	-4.2967	-3.5684	
TRGD**	Level	-3.4518	-4.2967	-3.5684	-3.1068	-4.2846	-3.5629	I_1
	1st Diff	-5.6643	-4.3098	-3.5742	-11.8843	-4.2967	-3.5684	

** = trend and intercept

Source: Computed from E-View 7.0 by the Researcher.

6.5 Cointegration Tests for Growth

Given the unit root properties of the variables, we proceeded to establish whether or not there is a long run cointegrating relationship among the variables by using the Johansen full maximum likelihood method. The methodology of Johansen for testing cointegration is sensitive to the lag length used in the model. Therefore, it is pertinent to perform optimal lag selection exercise before proceeding to Johansen test for cointegration. The result of the lag length test is presented in Table 6.4. It was evident from the result that the optimal lag length for the model is one and this incidentally corroborated with our model specification.

Table 6.4: Criteria for Selecting Lag Length for Growth

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6.400360	NA	0.117312	0.693357	0.880184	0.753125
1	-1.569137	8.052039*	0.091009*	0.437942*	0.671475*	0.512652*
2	-1.359850	0.334859	0.096159	0.490657	0.770896	0.580308

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Computed from E-View 7.0

We reported both the trace and maximum eigenvalue statistics and their critical values at 5% level of significance. The Johansen cointegration results based on the trace and max-eigenvalue statistics are presented in Table 6.5. The trace and maximum eigenvalue tests showed that there is one (1) cointegrating equation at 5% level of significance. For that reason, we therefore proceeded on the basis that at least, there was cointegration and then focused on the cointegrating relation that explains economic growth. This led to the usage of normalized equation to explain the relationship among the growth variables. This approach has been used by Mtonga (2006) and Pesaran et.al (2000).

As shown by the normalized cointegrating coefficients of economic growth, fitted observed productivity growth (PGRTST) influenced economic growth negatively. The slope coefficients of capital expenditure (GE) and consumers' tastes (TRGD) affected economic growth negatively. Consumers' tastes are time variants and tend to oscillate with GDP trends. The argument in favour of negative sign on the coefficient of capital expenditure could be explained within the context of growth retarding objectives of the corrupt bureaucrats. However, this objective is however solidified by corrupt bureaucrats in the form of investment in growth retarding projects. This may be the reason why corruption was more prevalent in Nigeria because expenditure designed to promote growth enhancing projects are channelled to productivity retarding projects. This has implications on economic growth. This result corroborated Mauro (1996), Tanzi and Davoodi (1997) submissions.

Productivity growth in the context of Nigerian economy however negated our apriori expectation. Productivity growth negatively correlated with economic growth. Stunted growth in productivity could be attributed to inefficiency in the productive capacity through corruption linkage. Corruption affected the marginal productivity of labour and capital, and at the same time reduce their efficiency by diverting attention of workers to rent-seeking behaviour. In the long run, the marginal productivity of labour falls. The same corruption also reduced the marginal productivity of capital when strict and bribe seeking regulations were instituted in the procurement of contracts in public offices. This result is consistent with the findings of Ades and Di Tella (1999), Wei and Wo (2001) and Dreher and Siemers (2003). The normalized cointegrating coefficient of growth equation formed the basis of generating the error correction term (ECM) in the error correction model.

Table 6.5 : Johansen Cointegration Test for Growth (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Per cent Critical Value	Max-Eigen Statistic	5 per cent Critical Value
None*	0.604	51.866	47.856	27.763	27.584
At most 1	0.409	24.103	29.797	15.757	21.132
At most 2	0.19	8.346	15.495	6.316	14.265
At most 3	0.065	2.031	3.841	2.031	3.841

Note: Trace and Max-eigenvalue tests indicates 1 cointegrating equation at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.

Normalized cointegrating coefficients (standard error in parentheses)

RGDP	PGRTST	GE	TRGD
1	-0.263	-0.869	-0.745
	(-0.175)	(0.14)	(0.122)

Source: Computed from E-View 7.0 by the Researcher.

6.6 Empirical Results for Growth

The essence of error correction representation is to capture the effect of short run movement in the empirical models in this study. It involves moving from over-parameterization to a parsimonious modelling. In general, the equation estimated an over-parameterized error correction model by setting the lag length long enough in order to ensure that the dynamics of the models have not been constrained by too short lag length. The overparameterized model presented in Table 6.6 was simplified until theory consistent and data coherent results are achieved by one by one deleting of the insignificant variables. We derived parsimonious model for the analysis from over-parameterized error correction model by adopting the General to Specific (GTS) methodology. This reduction was carried out by eliminating the variables with insignificant coefficients. The results of parsimonious error correction model are presented in Table 6.7.

Table 6.6: Overparameterized model for Growth

Dependent Variable: ΔRGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.274913	0.149745	1.835881	0.1160
ΔRGDP(-1)	1.064364	0.473412	2.248281	0.0656
ΔRGDP(-2)	0.634564	0.545621	1.163012	0.2890
ΔRGDP(-3)	0.237747	0.463035	0.513454	0.6260
ΔRGDP(-4)	0.058832	0.340248	0.172908	0.8684
ΔPGRTST	0.284874	0.438632	0.649461	0.5401
ΔPGRTST(-1)	-0.854147	0.813847	-1.049518	0.3344
ΔPGRTST(-2)	-0.387680	0.427869	-0.906072	0.3998
ΔPGRTST(-3)	-0.169134	0.364868	-0.463549	0.6593
ΔPGRTST(-4)	0.232335	0.758993	0.306110	0.7699
ΔGE	-0.189726	1.089685	-0.174111	0.8675
ΔGE(-1)	-1.247455	1.073682	-1.161848	0.2894
ΔGE(-2)	-0.920421	0.781906	-1.177151	0.2837
ΔGE(-3)	-0.804959	1.037139	-0.776134	0.4672
ΔGE(-4)	-0.156520	0.548997	-0.285101	0.7852
ΔTRGD	0.376930	0.187669	2.008485	0.0913
ΔTRGD(-1)	0.043587	0.213830	0.203841	0.8452
ΔTRGD(-2)	0.054061	0.242291	0.223125	0.8308
ΔTRGD(-3)	0.162286	0.192407	0.843451	0.4313
ΔTRGD(-4)	0.075315	0.373252	0.201780	0.8468
ECM(-1)	-2.022414	0.653087	-3.096698	0.0212

R-squared	0.902042	Mean dependent var	0.114426
Adjusted R-squared	0.575517	S.D. dependent var	0.343103
S.E. of regression	0.223540	Akaike info criterion	-0.106977
Sum squared resid	0.299820	Schwarz criterion	0.900896
Log likelihood	22.44419	Hannan-Quinn criter.	0.192717
F-statistic	2.762546	Durbin-Watson stat	1.525170
Prob(F-statistic)	0.105702		

Source: Computed from E-View 7.0

Since corruption constitutes an act perpetrated in secret, generating data for its empirical analysis becomes difficult and cumbersome. This study therefore explored the channel of productivity to explain the impact of corruption on economic growth. The coefficient of fitted observed productivity growth in lagged one period affected economic growth negatively. The justification for the negative sign could be that in the short-run, corruption affected the productivity efficiency, neutralized the effect of knowledge components of factors, and turned negative the externality from human capital. In the long-run, diminishing productivity returns retards economic growth.

The results showed that capital expenditure (GE) in lagged two periods influenced economic growth negatively. Capital expenditure could also be perverted to promote corruption especially where the scope and cost of projects cannot be ascertained. This tends to motivate public officers to corner larger chunk of the components of capital expenditure for personal gains. This result is consistent with the findings of Mauro (1996), Tanzi and Davoodi (1997) relating corrupt practices to capital expenditure manipulation.

Another interesting result from the analysis points to the impact of consumers' tastes on economic growth. The coefficients of consumers' tastes positively affected growth. As tastes for consumer goods and services rises, it widened the horizon of productive capacity and in the end promotes economic growth. Tastes of consumers could however retard economic growth if public officers determined to maintain an established living standard by engaging in corrupt activities such as "kickbacks", "bribery", "fraud", "embezzlement", etc., as supplementary income (windfall income) to "make ends meet". This result is in consonance with the submission of Mauro (1996), Tanzi (2002), and Svensson (2005). The adjusted R^2 accounted for the overall effect of explanatory variables on the dependent variable in all the models (both in overparameterized and parsimonious model). The adjusted R^2 showed 73% of economic growth is explained by productivity growth, capital expenditure and consumers' tastes.

Table 6.7: Parsimonious Model for Growth

Dependent Variable: ΔRGDP

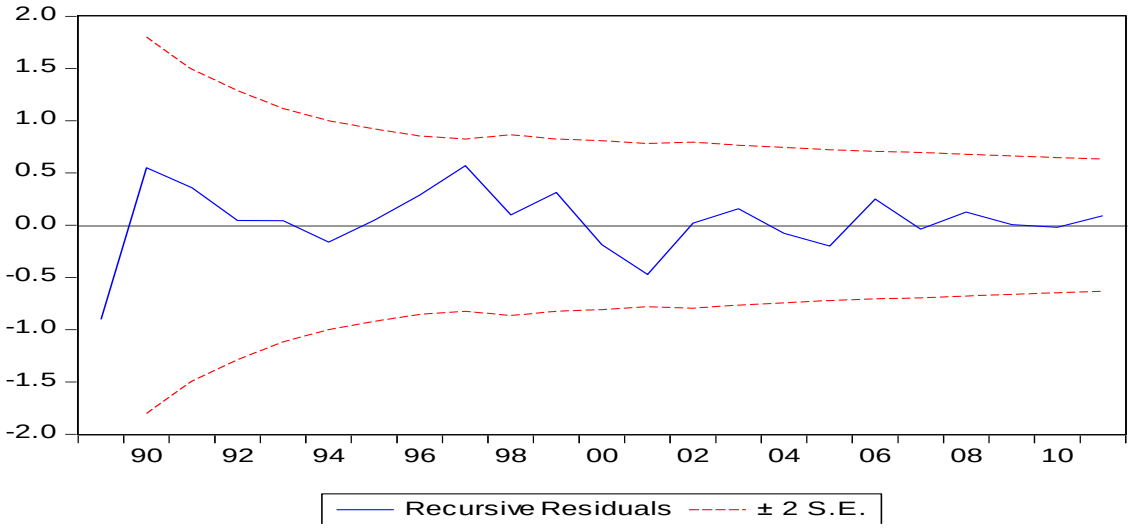
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.135156	0.039747	3.400377	0.0027
ΔRGDP(-1)	0.694290	0.133825	5.188021	0.0000
ΔPGRTST(-1)	-0.411839	0.150765	-2.731656	0.0125
ΔGE(-2)	-0.753597	0.295685	-2.548645	0.0187
ΔTRGD	0.341315	0.085901	3.973363	0.0007
ΔTRGD(-3)	0.231083	0.077757	2.971852	0.0073
ECM(-1)	-1.136983	0.151812	-7.489418	0.0000

R-squared	0.788027	Mean dependent var	0.103837
Adjusted R-squared	0.727463	S.D. dependent var	0.341319
S.E. of regression	0.178186	Akaike info criterion	-0.399659
Sum squared resid	0.666756	Schwarz criterion	-0.066608
Log likelihood	12.59522	Hannan-Quinn criter.	-0.297842
F-statistic	13.01152	Durbin-Watson stat	2.597979
Prob(F-statistic)	0.000004		

Source: Computed from E-View 7.0

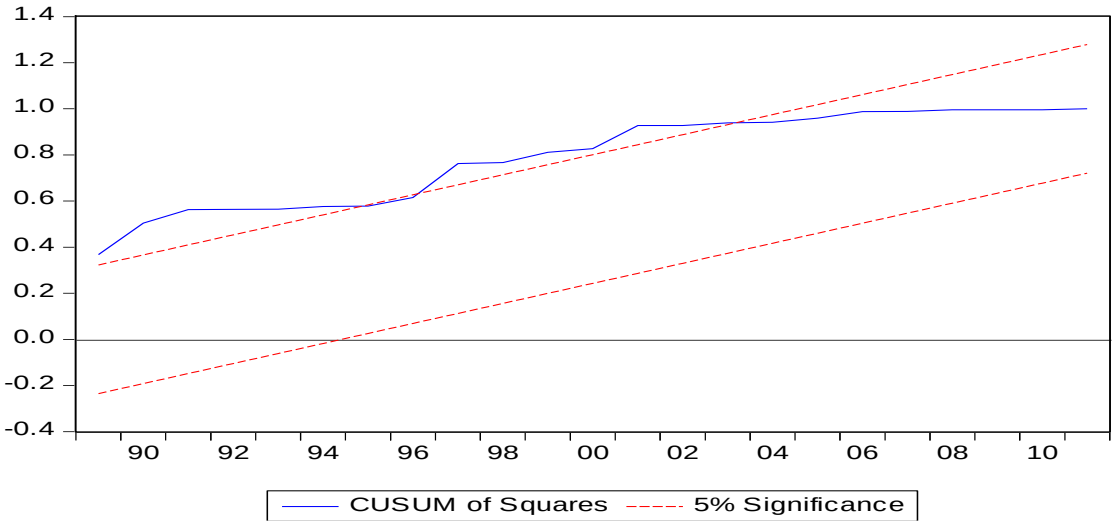
6.6.1 Stability Analysis for Growth

In this section, the stability properties of the short-run dynamic model are examined. The recursive residual was within ± 2 standard error bounds throughout the periods with little stability (figure 6.1). The plot of the CUSUM squares (figure 6.2) corroborated this view. The plot actually opened the instability in the system above 5% significance bound during these periods. This period corresponded to the period of macroeconomic instability coupled with massive looting of treasury by the public officers. Further examination revealed that the main sources of this instability over this period came from the instability in the coefficients on the short-run estimates of productivity growth and capital expenditure which enveloped corruption (Figure 6.2). This result suggested that corruption has detrimental effects on growth as reinforced by Mauro (1995,1997,1998), Tanzi (1998), Kaufmann and Wei (1999), Gupta et al.,(2000).



Source: Drawn with the data from CBN (2012)

Figure 6.1 : Recursive Residuals for Growth



Source: Drawn with the data from CBN (2012)

Figure 6.2 : CUSUM of Squares for Growth

6.6.2 Model Appraisal and Validity for Growth

The diagnostic test statistics reported for growth in this section are quite satisfactory. In assessing the robustness of the model estimated, some residual tests were conducted. Table 6.8 and 6.9 presents the residual serial correlation LM tests and the residual normality test. The table showed clearly that there was no residual autocorrelation in the model. The residual normality test was computed using the skewness, kurtosis and Jaque-Bera statistics with Cholesky (Lutkepohl) Orthogonalization. A clear result from this exercise was that the residuals are normally distributed.

Table 6.8: Residual Serial Correlation LM Tests for Growth

Null Hypothesis: no serial correlation at lag order h

Lags	LM-Stat	Prob
1	0.004358	0.9474
2	0.329432	0.5660
3	1.062869	0.3026
4	0.944612	0.3311
5	0.898915	0.3431
6	0.006867	0.9340
7	0.127592	0.7209
8	1.280608	0.2578
9	0.422080	0.5159
10	0.195909	0.6580
11	0.052057	0.8195
12	1.892352	0.1689

Probs from chi-square with 1 df.

Source : Computed from E-view 7.0

Table 6.9 : Residual Normality Test for Growth

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Component	Skewness	Chi-sq	Df	Prob.
1	1.242853	7.465966	1	0.0063
Joint		7.465966	1	0.0063
Component	Kurtosis	Chi-sq	Df	Prob.
1	5.429980	7.134973	1	0.0076
Joint		7.134973	1	0.0076
Component	Jarque-Bera	Df	Prob.	
1	14.60094	2	0.0007	
Joint	14.60094	2	0.0007	

Source: Computed from E-view 7.0

CHAPTER SEVEN

ANALYSIS OF SURVEY DATA

7.1 Introduction

This chapter presents the results from the survey of corruption in Nigeria. In order to achieve the objective of the study, both public and private sector workers were engaged in the survey. Convenience sampling technique was adopted. Convenience sampling is a non-probability sampling technique where respondents are selected based on accessibility and proximity to the researcher. The respondents are selected because they are very easy to recruit and accessible. This study used convenience sampling technique because it is fast, inexpensive, easy and the respondents are readily available. The probability of selection of respondents cannot be accurately determined. It involves the selection of elements based on assumptions regarding the population of interest, which forms the criteria for selection. Results from the survey were analyzed based on the following: respondents' characteristics and classification, socio-economic and demographic characteristics, household income and work environment and motivational factors for corrupt practices. The chapter concluded with a number of variables, which are perceived to determine corruption within the framework of Nigerian economy.

7.2 Organization of the Survey

Convenience survey was conducted in Lagos and Abuja. Questionnaire was given to the respondents to complete and hand in. The respondents were chosen based on the fact that they were readily available, convenient and accessible to the researcher. Accordingly, six criteria were applied in administering the questionnaire among the workers in the two chosen survey area. The criteria were based on monthly income stream of respondents in the following category:

(i) Monthly income range: less than ₦10,000

(ii) Monthly income range: ₦10,000 – ₦30,000

(iii) Monthly income range: ₦31,000 – ₦50,000

(iv) Monthly income range: ₦51, 000 – ₦70,000

(v) Monthly income range: ₦71,000 – ₦ 100,000

(vi) Monthly income range: Above ₦100,000.

7.3 The Study Population and Sample

The target population for the study consisted of all the public and private sector workers in Lagos and Abuja[38]. Since the population is large, it is practically impossible to take a complete and comprehensive study of it due to the nature and dispersal of the elements in the population. Samples used for the study were selected from ten (10) local governments area in Lagos and Federal Civil Service (both public and private), Abuja. The total questionnaire administered was three thousand (3,000). From the total questionnaire administered, two thousand five hundred (2,500) were returned, correctly filled ones totalled one thousand nine hundred and seventy six (1,976), badly filled totalled five hundred and twenty four (524). To that effect, the correctly filled questionnaire were used for the study. Lagos was chosen because it constitutes a thick commercial nerve centre and contains large population of workers. Abuja inclusion can be justified from the view point that it is the administrative base of the nation and large numbers of civil servants work there. The sampling method adopted was convenience sampling.

7.4 Criterion Group Returns: Respondent's Characteristics and Classifications

Table 7.1 presents the demographic features of the samples and these include: gender, age, marital status, occupation status, years in service, educational qualification and income brackets of the respondents.

[38]. Ten (10) local governments' areas (Ojo, Mushin, Ajeromi-Ifelodun, Oshodi-Isolo, Badagry, Amuwo-Odofin, Ikorodu, Ikeja, Alimosho, and Epe) were selected in Lagos State, and at the same time, workers at the Federal Civil Service and Private Sector were selected in Abuja to ascertain the socio-economic factors influencing corruption in Nigeria.

Table 7.1: Descriptive Statistics of Socio-Demographic Characteristics of the Sample

Variables	Frequencies (Percent)
Gender	
Male	1248 (63.2)
Female	728 (36.8)
Total	1976 (100)
Age Group	
< 20 years	78 (3.9)
20-29 years	311 (15.7)
30-39 years	1063 (53.8)
40-49 years	470 (23.8)
50-59 years	54 (2.7)
Total	1976 (100)
Marital Status	
Single	508 (25.7)
Married	1417 (71.7)
Divorced	51 (2.6)
Total	1976 (100)
Main Area of Occupation where currently involved	
Commerce and industry	309 (15.6)
Private practice	372 (18.8)
Public Administration/ Government	1025 (51.9)
Education	237 (12.0)
Banking	33 (1.7)
Total	1976 (100)
Position currently Held	
Company Director	46 (2.3)
Partner in private practice	132 (6.7)
Manager	508 (25.7)
Supervisor	251 (12.7)
Internal Auditor	129 (6.5)
Fraud Examiner	36 (1.8)
Academic	56 (2.8)
Government/Public Official	814 (41.2)
Others	4 (0.2)
Total	1976 (100)
Years in Service	
< 1 year	57 (2.9)
1-5 years	789 (39.9)
6-10 years	413 (20.9)
11-15 years	491 (24.8)
> 15 years	226 (11.4)
Total	1976 (100)
Educational Qualification	

Secondary Education	165 (8.4)
Polytechnic	522 (26.4)
College of Education	38 (1.9)
University	1131 (57.2)
Professional	120 (6.1)
Total	1976 (100)
Monthly Income Brackets	
< ₦10,000	172 (8.7)
₦10,000 - ₦30,000	438 (22.2)
₦31,000 - ₦50,000	524 (26.5)
₦51,000 - ₦70,000	371 (18.8)
₦71,000 - ₦100,000	273 (13.8)
> ₦100,000	198 (10.0)
Total	1976 (100)

Source : Computed from the survey data (2011)

Table 7.1 shows the aggregate responses of workers from the public and private sectors in the chosen area of sample in Lagos and Abuja. This actually show the coverage and trends of our samples. From the table, we observed that males dominated the samples with 63%, while the female counterparts was 37%. It can therefore be inferred that 26% of the respondents were single, 72% married while 3% divorced. The distribution based on economic area of specialization showed that 16% of the respondents are from commerce and industry, 19% engaged in private practice, 52% are public officers, 12% from academics and the remaining 2% came from the banking industry. This simply implies that public sector absorbed more workers than the other sectors. The age groups below twenty (20) years are not relevant for the analysis of the study because they are mostly dependants. The combined age brackets of people that falls within the range 30-39 and 40-49 years constituted about 78%. These age brackets are relevant for the analysis of the study.

A large number of respondents, precisely 41% are public sector workers while other job types constitute smaller proportions of the sample. Educational qualification of workers are equally relevant to the discussion of corruption in Nigeria. Workers having secondary school education constituted about 8%, polytechnic education, 26%, college of education, 2%, university education, 57% and professional education, 6%. This implies that workers with higher educational qualification constituted a larger percentage of the sampled respondents.

The analysis of monthly income of workers would further provide a better understanding on the determinants of corruption in Nigeria. The breakdown of the income in Table 7.1 shows that large number of workers in Lagos and Abuja falls within income range of ₦31,000 and ₦50,000. This implies that the proportion of workers in this income brackets constituted about 27%. Similarly, workers with monthly income range of ₦51,000 and ₦70,000 constituted about 19% of the sample. The joint combinations of the two income brackets shows that 46% of the workers received monthly income between ₦31,000 and ₦70,000 respectively. Twenty two per cent (22%) and fourteen per cent (14%) of the workers had income within the range of ₦10,000 - ₦30,000 and ₦71,000 - ₦100,000 respectively. The proportion of income brackets of workers above N100,000 stood at ten per cent (10%). Observations from the survey data shows that workers with relatively low income easily gets involved in corrupt practices in order to augment the low income received. This does not implies that workers in high income brackets are free from corrupt practices. Monthly income received by workers is not be the

only motivating factors for corruption in Nigeria. Many other factors, as espoused in the survey data indicating the rationale for corruption in public and private sectors in Nigeria.

7.5 Presentation and Analysis of Data According to Research Questions

Table 7.2 clearly showed that a large number of the sample is aware of the significance of household income in exchange for their productivity. However, twenty nine per cent (29%) of the respondents were of the opinion that the monthly incomes received in exchange for employment service are not commensurate with productivity. Forty-five per cent (45%) of the workers in Lagos and Abuja believed that the income received was only a subsistence income. Nine per cent (9%) of the workers consented that the monthly income was infinitesimally low compared with productivity efforts. Approximately seventeen per cent (17%) of the workers believed that the income they received was minimally acceptable to address welfare needs. Work environment to a greater extent determines the pervasiveness of corruption and rent-seeking behaviour of workers in Nigeria. Based on the survey data, 40% of respondents shared the opinion that Nigeria's work environment is strictly politically controlled. Responses that tilted to the opinion that the work environment in Nigeria is individually controlled constituted about 25% while 16% of the respondents were of the opinion that work environment in Nigeria is institutionally weak and largely bureaucratic in nature to prevent corruption from germinating.

Table 7.2: Household Income and Work Environment

Variables	Frequencies (Percent)
Annual Income Growth	
Income not commensurable with productivity	570 (28.8)
Income growth only a subsistence income	898 (45.4)
Income is infinitesimally low	180 (9.1)
Income is minimally acceptable	328 (16.6)
Total	1976 (100.0)
Income and Welfare Needs	
Sufficiently good	128 (6.5)
Below subsistence level	564 (28.5)
Minimally acceptable	885 (44.8)
Absolutely poor	399 (20.0)
Total	1976 (100.0)
Work Environment	
Strictly Bureaucratic	390 (19.7)
Institutionally weak	313 (15.8)
Politically controlled	785 (39.7)
Individually controlled	488 (24.7)
Total	1976 (100.0)
Rent Seeking	
Agreed	904 (45.7)
Strongly Agreed	474 (24.0)
Disagreed	468 (23.7)
Strongly Disagreed	1 (0.1)
Undecided	129 (6.5)
Total	1976 (100.0)

Source : Author's computation from survey data (2011)

The survey conducted provided some insightful results on the rationale for corruption in Nigeria. We disaggregated the survey response to show the reasons why people get involved in corrupt activities in both public and private sectors. Tables 7.3a and 7.3b shows the rationale for public and private sector corruption in Nigeria. When asked to categorize corruption in Nigeria, bribery and embezzlement of funds topped the list of responses on the survey data. Sixty five per cent (65%) of the samples in the public sector posited that corruption largely involves bribery and embezzlement of funds, while in the private sector, sixty four per cent (64%) of the samples shared the same perception that bribery and embezzlement of funds ranked highest in the corruption profile in Nigeria. The abuse/ misuse of office by public and private workers ranked next to bribery and embezzlement of funds in the survey responses. Twenty two per cent (22%) of the representative sample in public and private sectors were of the opinion that corruption has to do with abuse/ misuse of office for personal gain. Kickbacks in the procurement of contracts also featured among the factors causing corruption in Nigeria. Ten per cent (10%) of the samples opined that corruption in the form of kickback takes place in private sector while eight per cent (8%) of the representative sample in the public sector shared the opinion that corruption takes the form of kickback. However, four per cent (4%) of the samples in both public and private sectors were of the opinion that corruption largely involves diversion of resources for personal gains.

When asked to state the reasons why corruption takes place in public and private sectors in Nigeria, poor wage and institutional structures ranked highest among the reasons enumerated in the responses with fifty four per cent (54%) from the public sector and sixty per cent (60%) from the private sector. Other reasons identified by the workers include: to maintain established living standard (public sector 10%, private sector 6%), to complement subsistence income (public sector 27%, private sector 24%), weak legal system structure (public sector 7%, private sector 5%), benefit/cost consideration on corrupt practices (public sector 2%, private sector 4%).

Corruption is not limited to the public sector. It also takes place in the private sector. The survey data showed that over seventy per cent (70%) of corruption takes place in the public sector while less than ten per cent (10%) takes place in the private sector.

Table 7.3a : Rationale for Corruption in the Public Sector in Nigeria

Variables	Frequencies (Percent)
Corruption in Nigeria	
Abuse/Misuse of Office	329 (22.1)
Sale of government property	1 (0.07)
Kickbacks in procurement contracts	126 (8.45)
Diversion of resources	61 (4.09)
Bribery and embezzlement of funds	974 (65.3)
Total	1491 (100.0)
Public/Private Sector Corruption	
To maintain established standard	149 (9.99)
To complement subsistence income	402 (27.0)
Weak legal system	100 (6.71)
Benefit/cost consideration	37 (2.48)
Poor wage and institutional structure	803 (53.9)
Total	1491 (100.0)
Location	
Public sector	1077 (72.2)
Private sector	96 (6.44)
Same in both sector	279 (18.7)
Do not know	39 (2.62)
Total	1491 (100.0)

Source : Author's computation from survey data (2011)

Table 7.3 b : Rationale for Corruption in the Private Sector in Nigeria

Variables	Frequencies (Percent)
Corruption in Nigeria	
Abuse/Misuse of Office	108 (22.3)
Sale of government property	-
Kickbacks in procurement contracts	48 (9.90)
Diversion of resources	20 (4.12)
Bribery and embezzlement of funds	310 (63.9)
Total	485 (100.0)
Public/Private Sector Corruption	
To maintain established standard	29 (5.98)
To complement subsistence income	119 (24.5)
Weak legal system	25 (5.15)
Benefit/cost consideration	19 (3.92)
Poor wage and institutional structure	293 (60.4)
Total	485 (100.0)
Location	
Public sector	371 (76.5)
Private sector	32 (6.60)
Same in both sector	69 (14.2)
Do not know	13 (2.68)
Total	485 (100.0)

Source : Author's computation from survey data (2011)

In order to ascertain the determinants of corruption in Nigeria, the survey respondents were asked to identify the factors motivating public and private sector corruption in Nigeria. Tables 7.4a and 7.4b show the factors which determine corruption in public and private sectors in Nigeria. Top on the survey data in public and private sector was low wage and poor working condition not commensurate with productivity, with few incentives and rewards for efficient performance. These are strong incentives for corruption in Nigeria. Forty-six per cent (46%) of the respondents in public sector believed that workers engaged in rent-seeking activities and corruption because of low wage and uncongenial working environment. Similarly, forty eight per cent (48%) of the respondents in private sector were of the opinion that workers engaged in corrupt activities because of low wage and poor working conditions. Eleven per cent (11%) and Eight per cent (8%) of public and private sector workers were of the opinion that weak institutions of government provided a breeding ground for corruption in Nigeria.

The judicial system is also expected to play a role in tracking corruption in Nigeria. Strong legal foundation and efficient legal systems could provide a stable macroeconomic framework for economic activity if adequate attention is paid to streamlining the entire legal structure in Nigeria. Failure of the legal system to provide for the enforcement of contracts undermines the operation of free market and, in turn, increases the incentives for agents to participate in unproductive activities. In line with this, twenty per cent (20%) of the respondents from the public sector were of the opinion that ineffective legal system contributed significantly to the growth of corruption in Nigeria. However, twenty three per cent (23%) of workers in the private sector shared similar perception regarding legal system.

The culture of affluence and ostentatious living that expects much from “big men”, extended family pressures, village/ethnic loyalties, and competitive ethnicity etc. influences corruption in Nigeria. A situation where man’s source of wealth is of no concern to the neighbour, public or the government provides a fertile ground for corruption. The survey results showed that five per cent (5%) of the respondents in public and private sectors believed that the culture of affluence and ostentatious living influences corruption in Nigeria. The political economy of Nigeria covers the democratic environment, effectiveness of the judicial system and governance culture. Eighteen per cent (18%) and sixteen per cent (16%) of the respondents in

public and private sectors were of the opinion that corruption is related to the deficiencies of the political system in Nigeria.

Natural resources endowments are one of the factors which featured in the literature promoting corruption. The justification here is that concentration of exports on natural resources is a proxy for rent-seeking opportunities. In order to corroborate this statement, the survey data showed that thirty eight per cent (38%) and thirty five per cent (35%) of the respondents in public and private sectors believed that natural resource endowments has positive linkage with corruption in Nigeria.

The role of public sector in Nigeria affords public officials some degree of discretion in the allocation of goods and services provided. This mechanism is reinforced if the wages public officials received are relatively low. This increases the likelihood of corruption. Seventy-six per cent (76%) of the survey respondents in both public and private sectors supported this view, while twenty one per cent (21%) in the public and twenty three per cent (23%) in private sectors were against this position.

Causal variables are often used in the literature as determinants and indicators of corruption. This study has selected variables that are correlated with the pervasiveness of corruption to explain the determinants of corruption in Nigeria. Greed and lack in wants ranked highest among the listed factors (39% and 42% of respondents in public and private sectors shared this position) causing corruption. The desire to meet basic minimum necessity is another factor motivating corruption. Seven per cent (7%) of the survey respondents in both public and private sector supported this position. Lack of information and transparency on rules and procedures ranked seventeen per cent (17%) and fifteen per cent (15%) in the responses from public and private sectors. Corruption cases not prosecuted appropriately in the law courts ranked eight per cent (8%) and nine per cent (9%) (in public and private sectors) and unfair business competition and practices ranked ten per cent (10%) in both sectors. Unclear rules with loopholes for manipulation ranked four per cent (4%) and three per cent (3%) in public and private sectors and non enforcement of rules and procedures ranked three per cent (3%) and two per cent (2%) in public and private sectors respectively in the survey data. The survey data showed that lack of transparency and accountability accounted for twelve per cent (12%) of corruption in Nigeria

Table 7.4 a: Determinants of Corruption in the Public Sector in Nigeria

Variables	Frequencies (Percent)
Determinants of Corruption	
Low wage and poor working condition	680 (45.6)
Weak institution of government	160 (10.7)
Ineffective legal system	301 (20.2)
Culture of affluence and ostentatious living	75 (5.03)
Political economy of Nigeria	275 (18.4)
Total	1491 (100.0)
Natural resource endowment factor	
Linear and proportional	657 (44.1)
Positive linkage	562 (37.7)
No idea	272 (18.2)
Total	1491 (100.0)
Public and Private sector size factor	
Agreed	709 (47.6)
Strongly Agreed	420 (28.2)
Disagreed	258 (17.3)
Strongly Disagreed	64 (4.29)
Do not know	40 (2.68)
Total	1491 (100.0)
Causal determinants of corruption	
Wants, Greed, Never Enough	586 (39.3)
Needs, Basic minimum not met	108 (7.24)
Lack of information and transparency on rules and procedures	256 (17.2)
Inaction of corruption cases reported	114 (7.65)
Unfair business competition and practices	149 (9.99)
Unclear rules with loopholes for manipulation	64 (4.29)
Non enforcement of rules and procedures	43 (2.88)
Poor or no proper accountability mechanism	171 (11.5)
Total	1491 (100.0)

Source: Author's Computation from Survey Data (2011)

Table 7.4 b: Determinants of Corruption in the Private Sector in Nigeria

Variables	Frequencies (Percent)
Determinants of Corruption	
Low wage and poor working condition	234 (48.2)
Weak institution of government	39 (8.04)
Ineffective legal system	111 (22.9)
Culture of affluence and ostentatious living	24 (4.95)
Political economy of Nigeria	77 (15.9)
Total	485 (100.0)
Natural resource endowment factor	
Linear and proportional	227 (46.8)
Positive linkage	170 (35.1)
No idea	88 (18.1)
Total	485 (100.0)
Public and Private sector size factor	
Agreed	244 (50.3)
Strongly Agreed	124 (25.6)
Disagreed	91 (18.8)
Strongly Disagreed	20 (4.12)
Do not know	6 (1.24)
Total	485 (100.0)
Causal determinants of corruption	
Wants, Greed, Never Enough	205 (42.3)
Needs, Basic minimum not met	36 (7.42)
Lack of information and transparency on rules and procedures	71 (14.6)
Inaction of corruption cases reported	44 (9.07)
Unfair business competition and practices	49 (10.1)
Unclear rules with loopholes for manipulation	14 (2.89)
Non enforcement of rules and procedures	10 (2.06)
Poor or no proper accountability mechanism	56 (11.5)
Total	485 (100.0)

Source: Author's Computation from Survey Data (2011)

7.5.1 Internal Consistency of Variables

The next step of the data analysis is the determination of the validity of scales used in the questionnaire. In statistics (Classical Test Theory), Cronbach's alpha is the most commonly used measure of reliability (i.e., internal consistency). It was originally derived by Kuder and Richardson (1937) for dichotomously scored data (0 or 1) and later generalized by Cronbach (1951) to account for any scoring method. Cronbach's alpha statistic is widely used in the social sciences, business, nursing, and other disciplines. Cronbach's alpha is used to ascertain the validity of questionnaire scales. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability.

Definition

Suppose that we measure a quantity which is a sum of K components (*K-items*): $X = Y_1 + Y_2 + \cdots + Y_K$. Cronbach's α is defined as:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2}\right) \tag{7.1}$$

where σ_X^2 is the variance of the observed total test scores, and $\sigma_{Y_i}^2$ the variance of component *i* for the current sample of persons.

If the items are scored 0 and 1, a shortcut formula is

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} P_i Q_i}{\sigma_X^2}\right) \tag{7.2}$$

where P_i is the proportion scoring 1 on item *i*, and $Q_i = 1 - P_i$.

Alternatively, Cronbach's α can be defined as:

$$\alpha = \frac{K\bar{c}}{(\bar{v} + (K-1)\bar{c})} \tag{7.3}$$

where K is as above, $\bar{v}$ the average variance of each component (item), and $\bar{c}$ the average of all co variances between the components across the current sample of persons (that is, without including the variances of each component).

The *standardized Cronbach's alpha* can be defined as

$$\alpha_{\text{standardized}} = \frac{K\bar{r}}{(1 + (K-1)\bar{r})} \tag{7.4}$$

where K is as above and $\bar{r}$ the mean of the $K(K-1)/2$ non-redundant correlation coefficients (i.e., the mean of an upper triangular, or lower triangular, correlation matrix).

Cronbach's α is related conceptually to the Spearman–Brown prediction formula. Both arise from the basic classical test theory result that the reliability of test scores can be expressed as the ratio of the true-score and total-score (error plus true score) variances:

$$\rho_{XX} = \frac{\sigma_T^2}{\sigma_X^2} \tag{7.5}$$

The theoretical value of alpha varies from 0 to 1, since it is the ratio of two variances. However, depending on the estimation procedure used, estimates of alpha can take on any value less than or equal to 1, including negative values, although only positive values make sense. Higher values of alpha are more desirable. Some professionals, as a rule of thumb, require a reliability of 0.70 or higher (obtained on a substantial sample) before they will use an instrument. Obviously, this rule should be applied with caution when α has been computed from items that systematically violate its assumptions. Furthermore, the appropriate degree of reliability depends upon the use of the instrument.

Internal consistency

Cronbach's alpha will generally increase as the inter correlations among test items increase, and is thus known as an internal consistency estimate of reliability of test scores. Because inter correlations among test items are maximized when all items measure the same construct, Cronbach's alpha is widely believed to indirectly indicate the degree to which a set of items measures a single unidimensional latent construct. It is easy to show, however, that tests with the same test length and variance, but different underlying factorial structures can result in the same values of Cronbach's alpha. Indeed, several investigators have shown that alpha can take on quite high values even when the set of items measures several unrelated latent constructs. Alpha treats any covariance among items as *true-score* variance, even if items co vary for spurious reasons. For example, alpha can be artificially inflated by making scales which consist of superficial changes to the wording within a set of items or by analyzing speeded tests.

A commonly accepted rule for describing internal consistency using Cronbach's alpha is as follows, however, a greater number of items in the test can artificially inflate the value of alpha and a sample with a narrow range can deflate it, so this rule should be used with caution:

Cronbach's alpha	Internal consistency
$A \geq 0.9$	Excellent (High-Stakes testing)
$0.7 \leq \alpha < 0.9$	Good (Low-Stakes testing)
$0.6 \leq \alpha < 0.7$	Acceptable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Technically, Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency). Cronbach's alpha is obtained on each scale of the different variable. The Cronbach's alpha is a reliability coefficient that indicates how well the items in a set are positively correlated to one another. The item analysis from the survey of corruption using seven questions (as indicated in Table 7.5) to determine how well the questions influences corruption in Nigeria. The Cronbach's alpha for the first item is above 0.7, which is promising. The other items in the table relating to the determinants of corruption all have a lower Cronbach's alpha. It should be noted that the reliability coefficient of 0.7 or higher is considered "acceptable" in most social science research situations. The cut-off for a reliable scale lies at a minimum $\alpha > 0.7$, which means that the item "would an economic agent (both in public and private sectors) be more efficient and effective if given a tip inducement" are internally consistent. The item "people who report corruptions are just people who like to create problems to others" has a Cronbach's alpha which is near 0.7. This item is therefore considered as being internally consistent. For the item "people who report corruption are likely to regret it", a better Cronbach's alpha can be obtained by deleting question 22 from the questionnaire. When this is done the following (improved) Cronbach's alpha's are obtained (See Table 7.6 and Table 7.7).

Table 7.5: Reliability coefficient for the Seven variables

Item Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
Would an economic agent(both in public and private sectors) be more efficient and effective if given a tip inducement.	18.45	24.481	0.639	0.708
There is no point in reporting corruption because nothing useful will be done about it.	19.23	16.693	0.652	0.547
People who report corruption are likely to regret it.	19.15	16.704	0.646	0.505
Most corruption is too trivial to be worth reporting.	19.11	17.669	0.502	0.555
People who report corruption are just people who like to create problems to the others.	20.44	23.134	0.682	0.647
Government officials are so poorly paid that they have no choice but to ask people for extra payments.	18.65	20.319	0.666	0.635
Paying bribes to government officials or doing favours for them helps overcome the red tape of bureaucracy.	18.51	19.381	0.542	0.586

Source: Author's computations using SPSS 15.0; underlying data from survey, 2011

Table 7.6: Reliability coefficient for Six variables

Item Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
There is no point in reporting corruption because nothing useful will be done about it.	15.42	16.244	0.581	0.657
People who report corruption are likely to regret it.	15.34	16.098	0.629	0.605
Most corruption is too trivial to be worth reporting.	15.30	16.304	0.564	0.626
People who report corruption are just people who like to create problems to the others.	16.63	22.588	0.639	0.736
Government officials are so poorly paid that they have no choice but to ask people for extra payments.	14.85	17.900	0.615	0.677
Paying bribes to government officials or doing favours for them helps overcome the red tape of bureaucracy.	14.70	18.827	0.593	0.683

Source: Author's computations using SPSS 15.0; underlying data from survey, 2011

Table 7.7 : Reliability coefficient for five variables

Total Item Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
There is no point in reporting corruption because nothing useful will be done about it.	13.60	14.303	0.657	0.685
People who report corruption are likely to regret it.	13.52	14.419	0.643	0.635
Most corruption is too trivial to be worth reporting.	13.48	15.013	0.651	0.678
Government officials are so poorly paid that they have no choice but to ask people for extra payments.	13.03	16.119	0.647	0.717
Paying bribes to government officials or doing favours for them helps overcome the red tape of bureaucracy.	12.89	17.194	0.685	0.729

Source: Author's computations using SPSS 15.0; underlying data from survey, 2011

7.6 Inferential Analysis

The major purpose of the application of inferential statistics in this thesis is to establish the influence of the twenty-three (23) predictor variables on corruption level in Nigeria using cross-sectional data. This was done so as to determine their direction as well as relative impact on the dependent variable. This approach was explored by Ades and Di Tella (1977), Seldadyo and de Haan (2006) and Ugur and Dasgupta (2011). In order to achieve this goal, this study used multivariate analysis (regression analysis) to simultaneously tests for the influence of all the predictor variables (regressors) on the dependent (regressand) variable (corruption). Specifically, the ordinary least squares regression method was used to test the impact of the twenty-three variables on corruption level obtained from the Likert scale. In the regression analysis, the following equation was estimated:

$$corruption_i = \beta_0 + \beta_1 incm31\_50 + \beta_2 incm51\_70 + \beta_3 incm71\_100 + \beta_4 incm\_abv100 + \beta_5 good\_incm + \beta_6 manageable\_incm + \beta_7 bureaucratic + \beta_8 instnaly\_weak + \beta_9 indv\_cntrld + \beta_{10} gvt\_handling + \beta_{11} gvt\_commitmt + \beta_{12} enough\_resources + \beta_{13} severe\_punish + \beta_{14} male + \beta_{15} commerce + \beta_{16} private + \beta_{17} education + \beta_{18} age30\_39 + \beta_{19} age40\_49 + \beta_{20} age50\_59 + \beta_{21} secondary + \beta_{22} poly\_nce + \beta_{23} professional + \varepsilon_i$$

Where:

i = The subscript representing each of the respondents.

β = Parameter estimates

ε = error terms

i. Dependent Variable

Corruption.

ii. Predictive Factors

incm31_50 = Monthly income between N31,000 and N50,000

incm51_70 = Monthly income between N51,000 and N70,000

incm71_100 = Monthly income between N71,000 and N100,000

incm_abv100 = Monthly income above N100,000

good_incm = Sufficiently good income

manageable_incm = Minimally acceptable income

bureaucratic = Bureaucratically controlled environment

instnaly_weak = Institutionally weak environment

indv_cntrld = Individually controlled environment

gvt_handling = Government handling of corruption case

gvt_commitmt = Government commitment in fighting corruption

enough_resources = Resources committed to fight corruption

severe_punish = Level of punishment

male = Gender sensitivity

commerce = Main area of corruption

private = Private sector

education = Educational corruption

age30_39 = Involvement of age group 30-39

age40_49 = Involvement of age group 40-49

age50_59 = Involvement of age group 50-59

secondary = Involvement of secondary education

poly_nce = Involvement of polytechnic and college of education

professional = Involvement of professionals

7.7 Interpretation of Results

Table 7.8 below presents the results, showing the determinants of corruption in Nigeria using twenty-three predictor variables obtained from the survey. According to the table, all the variables are significant at 1%, 5% and 10% level of significance except for the income range of 31 to 50 and income range above 100. The result showed how sensitive the following variables are to corruption: gender, position occupied at work, educational qualification, household income and welfare needs, work environment condition, resources available to fight corruption and level of punishment on corruption cases. Household income in relation to welfare needs has a direct positive effect on corruption level. Workers within income range of N51,000 and N100,000 have high degree of discretion in the allocation of goods and services, hence the likelihood for corruption is very high. The direct positive effect of income on corruption is consistent with the findings of Van Rijckeghem and Weder (2001) and Tanzi (1998).

There is a wide support in the literature for the view that the environment which people work promotes corruption and rent-seeking behaviour (Treisman 2000, Ades and Di Tella 1999, and Paldam 2003). The results obtained from the regression are not different from what was obtained in the literature. However, institutionally weak environment, measures put in place to combat corruption featured as top variable on the list of determinants of corruption in Nigeria. Institutionally weak environment relates to the deficiencies of economic and political systems to address the question of fiscal recklessness, ineffectiveness of judicial system and inappropriate democratic system jointly promoted corruption in Nigeria.

Measures put in place by the government to track and handle matters of corruption have a direct negative impact on corruption. However, the resources channelled to combating corruption have a direct positive impact on corruption. The coefficient of punishment meted out to those caught with corrupt practices showed a negative sign. This implied that the punishment was not very severe to serve as deterrents to vulnerable corrupt officers. Level of educational attainment and position occupied at work has a direct positive effect on corruption. The survey results showed that public and private officers in high level positions used their official position to divert resources for personal gains.

In terms of policy design, it is necessary to identify the factors which influenced corruption and at the same time track the most significant factor with appropriate policy measure. In summary, this results have shown that income received by workers is not the only motivating factor which determines corruption in Nigeria. Other factors such as welfare needs, work environment conditions, resources available to fight corruption and the level of punishment on corruption cases influences corruption as well. The study therefore recommends, apart from improving workers monthly income, government needs to commit substantial resources to promote social and welfare needs of the workers in order to discourage their attention away from rent seeking and corrupt practices.

Table 7.8: Regression statistics showing the Determinants of Corruption in Nigeria
Dependent Variable: Corruption

Variables	Coefficient	Std. Error	t-Statistics
Constant	16.555	0.334	49.609*
Incm31_50	-0.180	0.462	-0.389
Incm51_70	0.637	0.306	2.081**
Incm71_100	7.669	0.302	25.357*
Incm_abv100	-0.344	0.305	-1.129
Good_incm	-2.702	0.399	-6.765*
manageable_incm	0.477	0.215	2.220**
Bureaucratic	-6.056	0.232	-26.124*
Instnaly_weak	12.623	0.413	30.558*
Indv_cntrld	-8.914	0.245	-36.325*
Gvt_handling	-1.587	0.083	-19.201*
Gvt_commitmt	2.188	0.101	21.588*
enough_resources	6.891	0.204	33.710*
severe_punish	-2.248	0.185	-12.124*
Male	0.993	0.234	4.245*
Commerce	10.968	0.418	26.251*
Private	-1.198	0.196	-6.110*
Education	2.316	0.244	9.482*
Age30_39	-0.409	0.177	-2.304**
Age40_49	-4.907	0.327	-15.004*
Age50_59	4.928	0.413	11.930*
Secondary	-0.541	0.282	-1.916***
Poly_nce	-0.406	0.222	-1.829***
professional	-2.991	0.457	-6.542*
R^2	0.794		
Adj. R^2	0.792		
F- Statistics	327.706		
Significance F	0.000		

* = Significant at 1% level. ** = Significant at 5% level. *** = Significant at 10% level.

Source: Author's computations using SPSS15.0; underlying data from survey, 2011

CHAPTER EIGHT

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

8.1 Summary

In a broad sense, this study has analysed the relationship between corruption and economic growth in Nigeria. There are three objectives associated with this work. First, the study investigated the impact of corruption on productivity growth. Second, it analyzed the effect of corruption on economic growth through productivity growth. Third, it ascertained the determinants of corruption in Nigeria.

One of the justifications of the study was that there are many studies which have attempted to assess the relationship between corruption and economic growth but their findings have yielded conflicting and diversed results. It showed that the views on corruption-economic growth nexus remained polarized among economists. There are two schools of thought in this regard. The first school contended that corruption could act as a stimulant to growth and at the same time reduce bureaucratic delays. The other school of thought refuted the 'grease wheel hypothesis' and contended that corruption exerted adverse effects on long term economic growth and sustainable development. The study explored the relevancy of these two schools of thought within the context of Nigerian economy. The second justification for the study was built on the observed deficiencies in the methodological framework of modelling approach adopted in the previous studies. This study departed from the common methodological approach by incorporating corruption into the growth equation through the channel of productivity growth. The third justification for the study incorporated the impact of cultural, historical and institutional differences to ascertain the determinants of corruption in Nigeria.

Two approaches were adopted in addressing the objectives of the study: econometric technique and survey based technique. The econometric technique was used to analyze the first and second objectives of the study. The third objective was analyzed using a survey based approach. Based on the first and second objectives of the study, we explored the direct and indirect method to explain the effects of corruption on economic growth via productivity growth in Nigeria. A Barro-type endogenous growth model was used to estimate the relationship between corruption and economic growth, reconditioned to suite Nigeria's environment. The data employed in the study were estimated in phases staring with the unit

root test, cointegration analysis and error correction model. Specifically, unit root test was conducted to detect the order of integration of the variables using the ADF and PP tests respectively. The study used cointegration test to examine the long run co-movement of the variables used in the model. The ECM measured the short run dynamic adjustments towards long run equilibrium.

8.2 Findings

There are two sets of results obtained from this study: the econometric results and survey results. First, the econometric results showed that national system of innovation, law and order and corruption have long run relationship with productivity growth. National system of innovation and law and order are statistically significant and yielded positive influence on productivity growth. Corruption affected productivity growth negatively. It was observed that trade openness affected productivity growth positively. The growth results showed that productivity growth did not promote economic growth in Nigeria. It affected growth negatively. Stunted growth in productivity had linkage with corrupt practices and inefficiency in productivity efforts. Capital expenditure however, influenced economic growth negatively. This showed that the components of capital expenditure have been perverted to promote growth retarding projects. Consumers' tastes affected economic growth positively. As tastes of consumers' for goods and services increased, it widens the horizon of productive capacity and in the long run promotes economic growth.

The survey of corruption was undertaken in both public and private sector to ascertain the determinants of corruption in Nigeria. The survey was conducted in ten (10) local governments' areas in Lagos State and Federal civil service in Abuja. The survey result showed that the position occupied at work by public and private sector workers determined to a large extent the base of corruption in Nigeria. Workers with higher educational qualification were found to have high discretion for allocating resources and are prone to corruption. The survey data showed that there are gaps in workers income in relation to productivity and the only alternative safety option for workers to make ends meet was to engage in corrupt and rent-seeking activities. From the above summary of findings, it can be concluded that the following are the determinants of corruption in Nigeria:

(i) Low civil service salaries and poor working condition not commensurate with productivity, with few incentives and rewards for efficient performance.

(ii) Failure of the legal system to provide for the enforcement of contracts undermines the operation of free markets and in turn, increases the incentives for agents to participate in unproductive activities.

(iii) The culture of affluence and ostentatious living where man's source of wealth is of no concern to the public or the government provides a fertile ground for corruption.

(iv) Concentration of exports on natural resources.

(v) Greed and lack in wants.

(vi) A desire to meet basic minimum necessity of life.

(vii) Unprosecuted cases of corruption.

(viii) Unclear rules with loopholes for manipulation and non-enforcement of rules and procedures.

(ix) Lack of transparency and accountability.

8.3 Concluding Remarks

The study showed that corruption in Nigeria has reduced the productivity efficiency, neutralized the effect of knowledge components of factors, and turned negative the externality from human capital. The diminishing productivity returns retarded economic growth. Corruption has permeated completely into the contemporary Nigerian economic and socio-political systems and it has reflected in the growth and development path of the economy. The study observed corruption manifested in the form bribery, frauds, embezzlement, election rigging, and examination malpractice in Nigeria. The conclusion however, is that no matter the magnitude of natural resources endowed, the size of the foreign exchange earnings, technological know-how, the efficiency of labour and the availability of basic infrastructure, development cannot be sustained in Nigeria except corruption is eradicated.

8.4 Recommendations

This study has shown that corruption affected all sectors in Nigeria and has demonstrated its effect on productivity efficiency and economic growth. Consequent upon the findings of the study, one of the recommendations that could be made is that documenting public spending which falls under the category of capital expenditure should become major efforts in the immediate future in the economy. Such studies will assist decision makers to take appropriate policy measures given the available information on the position of the economy at any given time. There is need to stimulate factor productivity efficiency with the provision of basic core needs towards enhancing output. Government should intensify its efforts at re-orientating the society against the ills of corruption by establishing high ethical standards to which all and sundry must adhere.

8.5 Contribution to Knowledge of the Study

This study has contributed to knowledge in the following ways: First, most empirical works on corruption-growth relationship used panel, cross-country data and regression technique to analyzed the causes and consequences of corruption. However, this study departed from the common approach used in analyzing corruption by using a high dimension system to estimate productivity and economic growth in Nigeria. Second, this study conducted a survey on corruption in both public and private sectors to ascertain its determinants in Nigeria. There are very few studies in Nigeria that have done this. This is a new approach to the study of corruption and economic growth in Nigeria.

8.6 Limitations and Future Lines of Research

The following areas are suggested for further research: Endogenous growth models suggested that corruption influenced economic growth through a number of channels particularly investment, tax revenue, human capital accumulation and labour productivity, and political instability. This study focused on three of these channels and how they impacted on growth. Further studies should examine other possible channels through which corruption may influence economic growth in Nigeria. Also, this study analyses the relationship between productivity and corruption on one hand, economic growth and productivity on the other hand. Economic losses due to corruption were not examined. This is an area which needs to be explored in the future research. The thesis focused on bureaucratic corruption; it did not analyze political and grand corruption. Political corruption has a number of more complex

power relationships and this type of corruption has a destructive power on the economy. Examination of the motivations and the environment behind political corruption cases can give interesting results.

In the last chapter of the thesis, factors which ascertained the determinants of corruption were estimated in a multivariate regression analysis. It is therefore recommended that further studies should consider the use of both bivariate and multivariate tests.

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APPENDIX A

I am a PhD research student of the Department of Economics, University of Ibadan. This work is in fulfilment of the requirements for the award of Doctor of Philosophy (PhD) in Economics. The broad objective of this study is to analyze the impact of corruption on economic growth in Nigeria. In order to accomplish this objective, a survey of corruption would be undertaking both in the public and private sector to ascertain the determinants of corruption in Nigeria.

The objective of this survey is to examine some aspects of corruption in Nigeria both in public and private sector as well as the factors which motivates its occurrences. This necessitates the design of a well structured questionnaire.

The data collected will be applied for research purpose. The information obtained will be treated strictly anonymously and confidentially. Neither your name nor the name of your organization/ministry/parastatals will be mentioned in any document related to this study.

QUESTIONNAIRE

SECTION A

Instructions: Please tick the applicable box.

1 Gender : Male Female

2 Marital Status : Single Married

Divorced Widowed

3 Religion : Christianity Islam

Traditionalist Atheist

Other **(**Specify) …….....…..

4 Sector Affiliation Public Sector Private Sector

5 Locational Area of Office (please specify) **…….....**

6 How long have you been in the service?

Less than a year

Between 1 – 5 years

Between 6 – 10 years

Between 11 – 15 years

More than 15 years

7 Educational Qualification

Below Secondary Education

Secondary Education

Polytechnic

College of Education

University

Others (specify)…….....…

SECTION B

8 How would you categorize your countr**y?**

Developing Country

Medium Income Country

Less Developed Country

Rich Country

Others specify)…….....

9 Which system of government does your country practice?

Plutocracy

Democracy

Military

Monarchy

Others (specify)…….....…

10 How would you categorize the ethnic tribes in Nigeria?

Less than 3 tribes

Between 3 – 6 tribes

Between 7 – 10 tribes

Between 11 – 14 tribes

Between 15 – 18 tribes

More than 18 tribes

Others(specify)…….....

11. Please tick one of these annual income ranges which adequately reflects your annual income:

Less than N10, 000

Between N10, 000 – N30, 000

Between N31, 000 – N50, 000

Between N51, 000 – N70, 000

Between N71, 000 – N100, 000

Above N100, 000

12 How would you categorize the annual household income in relation to your productivity?

Annual income is not commensurate with productivity

Annual income is only a subsistence income

Annual income is infinitesimally low

Annual income is minimally acceptable

Others (specify)…….....…

13 Do the income received from paid employment good enough to take care of your welfare needs?

Sufficiently good

Absolutely below subsistence level

Minimally acceptable

Absolutely poor

Others (specify)…….....

14 How would you categorize the environment of your work place?

Strictly bureaucratic

Institutionally weak

Politically controlled

Individually controlled

Others (specify)…….....

15 Do the environment which people work often promote rent-seeking activities and corrupt practices?

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

16 How would you categorize corruption in Nigeria?

Abuse/Misuse of office

Sales of government property

Kickbacks in procurement contracts

Diversion of resources

Bribery and embezzlement of funds

Others specify)…….....

17 How would you rate the magnitude of corruption in Nigeria?

Low

Very low

High

Very High

Endemic

Others (specify)…….....

18 How would you characterized countries with high rate of corruption?

Developing countries

Transition countries

Low Income countries

Closed Economy

Others (specify)…….....

19 How often do government officials ask for bribes for services to be rendered?

Never

Seldom

Sometimes

Frequently

Constantly

20 Why do workers in public/private sector engaged in corrupt activities?

To maintain established standard

To complement subsistence income

Weak legal system

Benefit/cost ratio

Poor wage and institutional structure

Others (specify)…….....

21 Would an economic agent (both in public and private sector) be more efficient and effective if given an inducement tip?

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

22 How often would you assume that foreign firms operating in Nigeria are confronted with challenges related to illegitimate business practices, irregular payments and corruption?

Never

Seldom

Sometimes

Often

Constantly

23 How frequently do you think corruption is part of the business culture in Nigeria?

Never

Seldom

Sometimes

Frequently

Often

Always

24 Is it likely that the refusal of making irregular or informal payments might reduce the opportunities for both the individual and foreign firms operating in Nigeria?

No

Seldom

Sometimes

Frequently

Often

In general, yes

I do not know

25 Which among these lists of factors would you consider the most significant factor enthroning corrupt practices in Nigeria?

Low wage and poor working condition

Weak institution of government

Ineffective legal system

Culture of affluence and ostentatious living

Political economy of Nigeria

Others (specify)…….....…

26 Do countries that restrict trade and impose controls on capital flows have high incidence of corruption?

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Others (specify)

27 Do natural resource endowment of Nigeria have any linkage with corruption?

The linkage is not linear and proportional

The linkage is positive

I have no idea

Others (specify)…….....

28 Do the size of the public and private sector in Nigeria have any linkage with corruption particularly if the officials have high degree of discretion in the allocation of goods and services?

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

Others (specify)…….....

29 How would you categorize corruption and growth in Nigeria?

Beneficial

Harmful

Undecided

Others (specify)…….....…

30 Specializations in corruption occur most in which sector in Nigeria?

Public sector

Private sector

Undecided

Others (specify)…….....

31 Do you share the opinion that the prevalence of corruption in an economy is a threat to sustained growth and development?

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

32 Corruption is more pronounced and revealed in:

Democratic government

Military government

Others (specify)…….....

33 The rule of law and the supremacy of the constitution can go a long way in combating corruption in Nigeria.

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

34 Do you agree that ICPC and EFCC is political instrument of fighting corruption in Nigeria?

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

35 Immunity clause should be removed in the constitution in order to fight corruption effectively.

Agreed

Strongly Agreed

Disagreed

Strongly Disagreed

Undecided

36 Why have there been so few successful attempts to fight corruption in Nigeria?

……

……..

…….....

.....….....……

(You may use additional paper if the space provided is not adequate)

37 What do you think the government can do to strengthen its economy out of corruption?

……

……

…….....

…….…

(You may use additional paper if the space provided is not adequate)