**EFFECTS OF FOREIGN DIRECT INVESTMENT IN TELECOMMUNICATIONS SECTOR ON ECONOMIC GROWTH IN NIGERIA (1985-2015)**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF BANKING AND FINANCE**

**FACULTY OF SOCIAL MANAGEMENT SCIENCES, BOWEN**

**UNIVERSITY, IWO, OSUN STATE, IN PARTIAL FULFILLMENT**

**OF THE REQUIREMENTS FOR THE AWARD OF**

**MASTERS OF SCIENCE (M.Sc)**

**DEGREE IN BANKING**

**AND FINANCE**

**2017.**

**CERTIFICATION**

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**DEDICATION**

This project is dedicated to Almighty God, who is the AUTHOR and GIVER of life, for seeing me through my M.Sc. program in Bowen University, for preserving my life and providing for all my needs, may His name be exalted.

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**ACKNOWLEDGEMENTS**

I give all glory and honour to the Almighty father through the Lord Jesus Christ for His guiding spirit and protection throughout the course as well as for being the only source of knowledge, wisdom, understanding, strength and blessing for me and my entire family.

My appreciation goes to my esteemed supervisor Prof. P. E. Oribabor and my co-supervisor Mr. F.O. Obisesan for their brilliance, intelligence and constructive guide throughout the period of this research.

I owe my gratitude to my Head of Department, Dr. E.O. Adeleke for his motivation, enthusiasm, and technical advice throughout this study.

Also to my able lecturers, fellow colleagues and other scholars of the Department, especially Oyewale Temilola who has contributed immensely to the success of this work. I am using this opportunity to say thank you all.

I am also grateful to the entire staff of the Department of Banking and Finance, The Polytechnic, Ibadan, especially my HOD Mr J.O. Oke, Mr. J.A. Afonja and Mrs. T.A. Adesanya for their regular words of encouragement.

My sincere appreciation also goes to my husband Dr. Ajala Oyeniyi and my darling daughters for their regular love, care and understanding.

Finally, my appreciation also goes to a wonderful family Engr and Mrs Alabi for coming to my aid when I needed them most.

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**LIST OF ABBREVIATIONS**

CBN : Central Bank of Nigeria

FDI : Foreign Direct Investments

GDP : Gross Domestic Product

GSM : Global System for Mobile Communication

ICT : Information and Communications Technology

ITU : International Telecommunications Union

MNEs : Multi-National Enterprises

NCC : Nigerian Communications Commission

PLC : Public Limited Company

NEPAD : New Partnership for Africa’s Development

NET : Nigerian External Telecommunications

NITEL : Nigerian Telecommunications Limited

P&T : Nigerian Post and Telecommunications

R&D : Research and Development

RGDP : Real Gross Domestic Product

RNC : Royal Niger Company

UAC : United African Trading Company

UASL : Unified Access Service Licenses

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**ABSTRACT**

The study examined the Effects of Foreign Direct Investment in Telecommunications Sector on Economic Growth in Nigeria. It also examined the trends of FDI inflow to the telecom sector in Nigeria, evaluate the trends of the overall share of telecom sector in Nigeria Gross Domestic Product, the differences between FDI in the telecom sector in Nigeria before and within Global System for Mobile communication period, determine the impact of FDI inflow in telecom sector on economic growth and the relationship between the share of telecom sector in total Gross Domestic Product.

Data was obtained from Central Bank Statistical Bulletin and National Bureau of Statistics for the period of 1985-2015.Time series analysis was done on the data collected with the aid of E-views version 9.0. Test of hypotheses were done with Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) was used to determine whether or not the data was stationary. The Johansen Co-integration test was then used to test for co-integration. Additionally, paired T-Test was used to analyse the differences between Foreign Direct Investment in Nigeria between 1985 to 1999 (pre –GSM era) and 2001 to 2015 (GSM era).

Based on the findings of this study, the empirical results of Foreign Direct Investment in telecommunication sector has no significant effect on contribution of telecom to GDP in Nigeria with co-efficient of 0.15988; P- 0-043; F-statistics 7.011, Adjusted R-square value 0.720 and Durbin Watson 2.189 respectively. The relationship between contributions of the telecom sector to economic growth was positive and insignificant with the co-efficient of GDPtel (0.0327; 0.071).

The study has helped to achieve the objective that introduction of Foreign Direct Investment in telecommunication sector revealed positive result of 0.14687 and statistically insignificant at 5%.

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**CHAPTER ONE**

**INTRODUCTION**

**1.0 Background to the Study**

The current pace of globalization has made virtually no nation of the world totally self-dependent without having to rely on other nations. The reality of this development, over the years has made interaction through communication paramount in human development endeavour. This means that the ability to communicate over a wider range of distance has in one way or the other engendered business growth all over the world. It is in relation to this perception that the current age is termed the JET age where digital world is taking the lead.

The telecommunications aspects of the global ICTs are driven by various gadgets that facilitate the exchange of information between a given set of people. The telecommunications sector, or telecom as aptly called, is the transmission of signals, messages, writings, images, and sound or intelligence of any nature by wire, radio, optical or other electromagnetic systems within a range of distance. It began with the invention of the telegraph using analogue signals in 1837, followed by the telephone in 1876. Since both analog and digital communications are based on electrical signals, transmitted data is received almost instantaneously, regardless of the distance, people communicate with each other faster than before at the national or global front.

At independence, the control of Nigeria’s telecommunications sector, was vested in the Nigerian Post and Telecommunications (P&T) owned by the Federal Government. In the early 1980s, Nigerian External Telecommunications (NET) was formed to provide external communications services. Following increased demand for the commercialization of telecommunications services, the Federal Government initiated the merger of NET with the telecommunications arm of P&T to form the Nigerian Telecommunications Limited (NITEL) in 1985, saddled with the sole responsibility of meeting the telecommunications needs of Nigeria. At this time, the telephone system was unreliable, congested, expensive and unfriendly to customers. The main objective of establishing the NITEL was to harmonize the planning and coordination of the internal and external telecommunications services, rationalize investments in telecom development, provides accessible, efficient and affordable services.

Regrettably, NITEL which held a monopoly in the market for more than a decade was unable to meet the growing demand for telecommunications services by Nigerians. The company’s ascendancy was marked by frustratingly long queue for connections as well as poorly maintained and scanty infrastructure. At independence, the country had only 18,724 telephone lines (Ndukwe, 2003). Up till 2001 when telecom was fully deregulated, NITEL could not expand its capacity beyond 700,000 lines, thus limiting access to information and communications technology (ICT) in Nigeria. More than 50 per cent of the lines were in federal and state government offices, Multinational oil companies and other large corporations. The situation was so bad that even with the reportedly connected lines 35% were not functioning (Afeikhena, 2002).

In the early days of mobile system of communication in Nigeria, only the rich could actually afford the services. This period is termed the first generation of mobile telephony. The analog cellular was used, which basically allowed for voice communication only. This generation of mobile phones appeared not to exist in Nigeria since very few people really knew about cellular phones and was only available to a few percentage of the population. The use of land phone was therefore still pertinent in the country oriented services. Analog cellular was, therefore, regarded as a precious object to possess and those who had it were highly regarded.

During this period of mobile telecommunications, Nigerian phone users were confined to the use of fixed-phone communication system. It was therefore common sight to see long queue at phone boots, with everyone waiting for his or her turn, this is because only a few could afford to own land line due to high cost of connection, therefore callers opted for unit cards for public phone booths which were a bit affordable.

However, Decree 75 of 1992 allowed private sector participation in the sector and expanded the nation's communication facilities. (Onakoya, 2013). NITEL, the monopolistic state-owned enterprise was commercialized and floated as Public Limited Company (PLC) in 1992, although its shares were fully owned by the government. The Nigerian Communications Commission (NCC) was established by statute in 1992. The agency was given a mandate to issue license to private companies to participate in telecommunications business in Nigeria. It also encouraged Foreign Direct Investments (FDI) into the telecommunications sector in order to beef up healthy competitions among providers and create new employment opportunities and enable the springing up of indigenous telecommunications companies. Consequently many telephony service providers emerged; such as MTN and AIRTEL. Therefore this research work will look into the effects of Foreign Direct Investment in Telecommunications sector on Economic Growth in Nigeria.

* 1. **Statement of the Problem**

There are several problems that could be traced to non-performing of telecommunications sector in Nigeria, one of it is the single line of operation by the government in monopolizing its activities in the telecommunications sector. With the establishment of National Communication Commission (NCC) in 1992, a mandate to issue license to private companies to operate in the industry paved way for Foreign Direct Investment in telecommunications business and the concomitant effect on level of business performance in Nigeria. It is widely believed that economic growth depends critically on both domestic and foreign investments (Andenyangtso, 2005). Equally, the rate of inflow of foreign investment depends on the rate of economic growth.

Foreign direct investment plays a vital role to make substantial contribution to the economic growth by investing in sectors such as telecommunications and bringing along with other indirect positive impacts including transfer of technology, training, skills, employment, to name just a few, which all contribute to the long term development of the recipient countries. In addition, the outstanding increase in FDI inflows demands the analysis of their relationship because the positive relationship between FDI inflows and economic growth cannot be universally agreed and the certainty whether FDI cause economic growth can be varied, yet the critical importance of FDI inflow to one economy cannot be denied. Such an essential issue deserves further investigation for one specific country to clearly identify their linkage, and this is no exclusion for Nigeria.

However, empirical studies of the effects of FDI in telecommunications sector on economic growth are concerned with either the overall effect on growth or with specific aspects of contribution of telecommunications sector to Gross Domestic Product. Thus, the effects of FDI in telecommunications sector on economic growth remains unclear. It is, therefore, necessary to determine the effects of FDI in telecommunications sectors on economic growth in Nigeria.

* 1. **Research Questions**

Based on these perceived problems detailed above, the relevant research questions that this study seeks to address include:

1. What are the trends of FDI inflows to the telecom sector in Nigeria?
2. What are the trends of the performance of telecom sector in Nigeria?
3. What are the differences between FDI in the telecom sector in Nigeria before and within GSM period?
4. How has inflow of FDI to the telecom sector in Nigeria improved the performance of the sector?
5. What is relationship between the shares of the telecom sector in total GDP?

**1.4 Objectives of the Study**

The general objective of the study is to examine the effects of FDI in telecom sector on Nigeria economy. The specific objectives of this study are to:

(i) examine the trends of FDI inflow to the telecom sector in Nigeria

(ii) evaluate the trends of the overall share of telecom sector in Nigeria GDP

(iii) examine the difference between FDI in the telecom sector in Nigeria before and within

GSM period.

(iv) determine the impact of FDI inflow in telecom sector on economic growth.

1. examine the relationship between the share of the telecom sector in total GDP.

**1.5 Research Hypotheses**

In view of the stated research questions and the intended objectives of this study, the following hypotheses were formulated for this study:

1. FDI in the telecom sector has no significant effects on contribution of Telecom to GDP in Nigeria.
2. There is no significant difference between FDI in the telecom sector before and within the GSM period in Nigeria.
3. The contribution of the telecom sector to economic growth in Nigeria is not significant.

**1.6 Justification for the Study**

The surge in globalization and technological revolution has increased the use of ICT; especially GSM. This development has motivated attentions of researchers to critically examine the contribution of the telecom sector on economic growth in Nigeria like other countries of the world. Three dimensions or viewpoints of research are common with reference to telecom industry. According to Gold, Saibu, and Yusuf (2012), the first view basically considers the implication of telecom development on foreign direct investment and how such development leads to reducing transaction cost, increasing total factor productivity (TFP) of the private sector (Belaid, 2002). The second view examined the impact of telecom on overall macroeconomic performance by examining the effect of telecom development on economic growth, income generation of government and fiscal performance (Alleman, Hunt, Michaels, Mueller, Rappoport & Taylor 2004). In relation to this, Ajala and Adesanya (2016) determined the relationships between Telecommunications and economic development in Nigeria using ordinary least square (OLS) and revealed that telephone connected lines aids development in Nigeria. The last view however examined the growth of telecom on rural development and poverty reduction. Gold, *et al,* (2012) this present study is in line with the first view that establishes the link between FDI and telecommunications performance. However, the bulk of such studies did not examine the tripartite linkage among FDI inflow to the telecom sector and telecom performance, and economic growth in Nigeria. At best, it can be arguably said that there is still dearth of literature on the connection between FDI sectoral flows to telecom sector and their subsequent impact on the economy of Nigeria. Although empirical studies like Izuchukwu (2014), Ezeanyeji and Ifebi (2016) examined the issue of FDI and telecommunications sector in Nigeria, but their studies are significantly different from this present study in a number of ways: First, Izuchukwu (2014) examined the impact of the performance of telecom on FDI, treating FDI as dependent variable, while Ezeanyeji and Ifebi (2016) did examine FDI-driven telecom growth on economic growth as the researcher did in this study. In fact, scholars with interest on the determinants of FDI and economic growth in Nigeria abound (Adeleke, Olowe & Fasesin 2014; Offiong & Atsu 2014). Ogunleye (2014) conducted research on the effect of infrastructure facilities on the amount of Foreign Direct Investment in Nigeria and the impact of FDI on Nigeria economic growth between 1999 and 2013 respectively and shows that economic growth is directly related to inflow of FDI.

**1.7 Scope of the Study**

The focus of this study is to examine the effects of Foreign Direct Investment in telecom sector on economic growth in Nigeria within the period of 1985-2015. The choice of this fiscal year is underscored by the fact that before 1985, the development of telecommunication was not marked with rapid digitization in ICT and the use of GSM, while the post 1985 era witnessed massive use of GSM and inflow of FDI to boost infrastructures in the telecom industry. Most studies did not cover such a wide or expanded fiscal period.

**1.8 Definition of Operational Terms**

**Foreign Direct Investment (FDI):** Is an investment made by a company or entity based in one country into a company or entity based in another country.

**Gross Capital Formation (GCF):** Comprises of outlays on additions to the fixed assets of the economy and net changes in the level of inventories. It is taken as percentage of GDP.

**Communication**: Communication is the exchange of intelligible information between an encoder (the source of a message) and a decoder (the receiver/decoder) over a mediated platform. In this case the mediated platform is the telephone device.

**Economic Growth**: A positive change in the level of production of goods and services in Nigeria over 1985-2015

**Gross Domestic Product**: the nation’s total income and the total expenditure on its output of goods and services.

**Telecommunication**: It is the technology that is used to bring about communication of voice and data signals over some geographical distance.

**Private Telecommunications Operators**: Private telecommunications service providers that provide telecommunications services such as telephony and data communications access.

**Global System for Mobile Communication (GSM)**: a digital mobile telephony system that is widely used by cell phone technology.

**CHAPTER TWO**

**LITERATURE REVIEW**

This chapter deals with the review of relevant literatures on the research topic which were divided into conceptual review, theoretical review and empirical review.

**2.1 Conceptual Review**

It deals with the review of relevance concept and conceptual clarification of the basic variables that relates to telecommunication industry in Nigeria as it relate to this study. The review covers pre GSM era and the telecommunications policies under the current dispensation in Nigeria.

**2.1.1 Concept and Development of Telecommunications**

Telecommunications have been recognized as a crucial element in economic development. The United Nations Millennium Declaration identified access to Information and Communication Technologies (ICT) in general and telecommunications in particular as a fundamental to achieving greater goals (International Telecommunications Union -ITU) (2004). Thus, access to information and communication is considered important to a sustainable agenda of poverty reduction because it increases the efficiency and competitiveness of a country in the global economy, enables better delivery of health and education services and creates new sources of income and employment generation (World Bank, 2006). An effective telecommunications system, in one way or the other, enhances development as it also boosts investor confidence and promotes business transactions. Thus, the importance of telecommunications development to economic growth and development especially in the developing countries cannot be understated (Gyimah-Brempong & Karikari, 2007).

In this era, telecommunications is an indispensable tool in the entire process of globalization (Asogwa & Kelechi, 2013). The emergence of Telecommunications has brought about a new era in communication industry; the internet, mobile phone and computer, have brought about a fundamental shift in patterns of communication and human relationships. Communication revolution has also brought about amazing social, economic, cultural and psychological transformation. It has reduced the globe into a village through reduction of time and space (Keil & Johnson, 2005; Offurum, 2009). These transformations were spurred by technological innovations. Innovations in telecommunications technology have immensely influenced the development of mobile telecommunications services.

Actually, worldwide breakthrough in mobile technology is associated with the commercial introduction of digital technologies in the 1990s. Several reasons accounted for the success of digital mobile telephony. Firstly, by using limited radio spectrum, digital technology made the current levels of mobile telephony usage technically possible. Secondly, “combine with other industry development, digital telephony offered end users a more attractive bundle in terms of price, quality and services. The Digital mobile telephony had advanced data transmission (short messaging service etc) and improved voice quality over the years (Rouvinen, 2006). Also, with lower power consumption of digital mobile telephony, smaller and lighter end user terminal (handsets) became available. Thirdly, with expanding user base, network effects and economies of scale in both production and use accumulated rapidly. In short, with digitalization, mobile telephony truly became a worldwide consumer market (Rouvinen, 2006).

According to Izuchukwu (2014), telecommunications facilities in Nigeria were first established in 1886 by the colonial administration and that since independence in 1960, with an estimated population of roughly 40 million people, the country only had about 18,724 phone lines for use. This translated to a teledensity of about 0.5 telephone lines per 1,000 people. As at that time, the telephone network consisted of 121 exchanges of which 116 were of the manual (magneto) type and only 5 were automatic. Between 1960 and 1985, the telecommunications sector consisted of the Department of Posts and Telecommunications (P&T) in charge of the internal network and a limited liability company, the Nigerian External Telecommunications (NET) Limited, responsible for the external telecommunications service provided the gateway to the outside world. At this time, the telephone system was unreliable, congested, expensive and unfriendly to customers. The Nigeria Telecommunications Ltd. (NITEL) was established in 1985, and held a monopoly in the market for more than a decade. The company’s ascendancy was marked by a long wait times for connections and poorly maintained and scanty infrastructure. The main objective of establishing NITEL was to harmonize the planning and co-ordination of the internal and external telecommunications services, rationalize investments in telecommunications development and provide accessible, efficient and affordable services.

Furthermore, the government, in November 1992, established an independent regulator the Nigeria Communications Commission (NCC) that oversees the telecoms sector, but it was the inauguration of the board of the NCC under Ernest Ndukwe in 2000 that saw the NCC delivers its promise as a dynamic actor in the sector. In 2003, the Nigerian Communication Act gave powers previously residing with the Ministry of Information and Communication to the NCC, reducing the role of the Ministry to policy-making and giving the NCC a free hand in regulating the industry. The NCC introduced a new licensing framework in the sector in 2006, with the introduction of technology-neutral Unified Access Service Licenses (UASL), which allow providers to offer fixed, mobile and data services using the technology of their choice. The market was transformed by the government decision to issue GSM licenses. Awarded in an open auction, the licenses were given to NITEL, operating as M-Tel, South African telecoms company, MTN and consortium led by Zimbabwe’s Econet wireless. Consumers immediately flocked to the new technology which provided a way to leapfrog the limited fixed-line infrastructure, and within a year, there were over 1.5 million mobile subscribers in the country, as compared to just 702,000 fixed-line subscribers (Izuchukwu, 2014).

Currently the major players in the Nigeria mobile market are MTN, Globacom, Airtel Nigeria and Etisalat. Nitel’s dominance of the fixed-line market came under siege in 2002, when the government awarded a second National Operator license to Globacom, which also received a GSM license. To protect the national fixed-line operators, the government embarked on privatizing the parastatal. The first effort in this direction involved the firm Pentascope, partly funded by the consortium of Nigeria banks, which acquired 51% of Nitel in 2003 (Izuchukwu, 2014). But the company was unable to stop Nitel shedding customers to the mobile operators, and even as other mobile networks boomed, Nitel’s mobile arm lost market share. So, the government turned to Transnational Corporation of Nigeria (Transcorp), which acquired 51% of Nitel in 2006, such privatization warranted other foreign investors.

In this present world, a modern telecommunications infrastructural development is not only essential for domestic economic growth, but is a prerequisite for participation in increasingly competitive world markets and for attracting new investments. Thus, Nigeria today has not been left out of rapid development of telecommunications industry in the world. The nation’s telecommunication industry was liberated with the return of democracy in 1999. This led to the granting of Global System for Mobile Telecommunications (GSM) licenses by the Nigerian Communication Commission (NCC) to three providers: Econet, MTN, and M-tel. This was followed by the licensing of the Second National Operator (SNO), in 2003; that is, Globacom and Universal Access Service licenses of 2006 which include fixed telephony, VSAT and internet service providers. Also, in March 2008, the NCC gave license to another GSM operator known as Etisalat (Aigbinode, 2008).

**2.1.2 Concept of Foreign Direct Investment (FDI)**

FDI is the movement of capital across national frontiers in a manner that grants the investor control over the acquired assets. Firms that use FDI are known as Multi-National Enterprises (MNEs). Production in the host country is largely financed by multinationals and profits accrue to the multinationals through sales made by foreign affiliate. It refers to long term participation by one country into another and this comes in form of management, joint ventures or transfer of technology and expertise. The preference for FDI stems from its acknowledged advantages (Sjoholm 1999; Obwona, 2001, 2004). The efforts by several African countries to improve their business climate stem from the desire to attract FDI. In fact, one of the pillars on which the New Partnership for Africa’s Development (NEPAD) was launched was to increase available capital to US$64 billion through a combination of reforms, resource mobilization and conducive environment for FDI (Funke and Nsouli, 2003), even in Sub-Saharan Africa as a region, Asiedu (2002) shows that most countries now depend very much on FDI for so many significant number of reasons.

**Developmental stride of FDI in Nigeria**

With reference to Nigeria, the origin and development of FDI can be traced to the activities of the Royal Niger Company (RNC) which was granted Charter in 1886 to ship palm oil from Nigeria to Liverpool and importing the processed palm oil back into the country in form of soap. This company merged with African and Eastern Trading Corporation to later form the United African Trading Company (UAC) a subsidiary of Unilever in Nigeria. Other firms that made significant impacts in the development of the FDI in Nigeria are Shell BP in the oil sector exporting its first oil in 1958. This follows by gulf oil (now Chevron), Mobil, ELF, Agip, Texaco to mention a few. Other sector includes John Holts, UTC, Julius Bergers, etc (Baridan, 1990).

Also, in the post-civil war period, Nigeria witnessed the advent of oil companies and the period (1973-79) saw the influx of FDI giving the country its greatest revenue in history with annual revenue of about $7.5billion. Based on this level of revenue, Nigeria was reckoned as the wealthiest black African country. The third National Development plan (1975-1980) was considered as the testing ground for assessment of Nigeria with expenditure of N30 billion or N50 billion quotes. This level of expenditure became a fertile ground for investors both foreign and indigenous. The first ever international trade fair held in 1977 attracted 57 foreign countries and 300 Nigerian companies. Following this event, there were explosions of FDI in Nigeria including IBM, Dupon, Chase Mahathan, ITT, Ford Motors, as well as influx of foreign operators (investors) in the telecommunication market, even in the banking sector, the nationalization of two British banks, Barclays Bank (now Union Bank of Nigeria Plc) and standard Bank (now First Bank of Nigeria Plc) was seen as a healthy development in the economy in the light of nationalism. Thus, FDI in Nigeria dominated the economy until 1972 when the Nigerian Enterprise Promotion decree came into being to check the activities of FDI in Nigeria. Commenting on this inflow of FDI, many scholars believe that FDI has positively contributed to the economy and Nigeria’s national development. FDI contribute to rural development through their operations. Example is the rural banking scheme of 1977-1980. FDI engages in projects that support self-sufficiency according to the federal government’s directive. Example is the Guinness Nigeria Plc 4500 hectares of farm land at Kuru in Niger State. Standard of living is enhanced by the FDI in improved wages paid by them. They support manpower development through their scholarship programmes for Nigerians (Nnedu, 1990). Despite these developments, it is still believed that FDI failed to reinvest most of their profit in the country thereby aiding capital flight out of the country. Even when FDI established manufacturing facilities in Nigeria, they still engage in substantial importation of intermediate products; a practice that helps to deplete foreign exchange reserve of the country. According to Amy and Saggi (1998), FDI rather than transfer technology often transfer the product of technology. FDI brings in capital but also take away capital (Enoch, 2012). Akhter, (1993) in his analysis conducted between 1971 and 1988 showed that Nigeria was clearly financing the developed countries. In terms of basic functions of FDI, Edun and Lekan (1990) put forward the following as the contribution of FDI to the Nigerian economy:

1. FDI investment has stimulated the diversification of Nigeria’s economy. Their capital input has helped the government to fulfill nationally defined economic development goals.
2. They contribute to rural development by opening their operation policy in rural areas according to government policy e.g. the rural banking scheme established in 1977.
3. The FDI comes with modern technology and know-how required for their operation.
4. They comply with the government’s move for national self-sufficiency by engaging in agricultural projects e.g. 4500 hectres farm planted by Guinness Plc in Kudu in Niger State.
5. Standard of living is enhanced by the activities of FDI through increased wage pay compared with what is paid by the local employers.
6. Manpower development is achieved through the activities of FDI in the area of giving scholarship to deserving Nigerians e.g. Shell Petroleum Scholarship Scheme.
7. The foreign direct investment forms the biggest single source of job creation over the past few decades. This becomes even greater if the spillover to other areas of the economy is considered; foreign companies in Nigeria employ a sizeable portion of Nigerian industrial work force.
8. Foreign investors have assisted and induced government in providing infrastructural facilities and have led to greater national efficiency. Also through learning, the imported technology has diffused throughout the economy thus leading to greater utilization of resources.
9. Social responsibility; in spite of all odds and the commitment of resources and manpower to their ordinary business, FDI ventured into corporate social responsibilities, by sponsoring sporting activities nationwide. Guinness Plc has built three eye hospitals for the less fortunate, located in Kaduna, Onitsha and Lagos.
10. Foreign finance participation which took the form of foreign exchange had the beneficial effect of directly relieving the foreign exchange storage. At the same time, it is indirectly operational in an anti-inflation any manner by permitting more of the existing foreign exchange resources to be used to bring in consumer goods to lessen the pressure on prices.

Aremu (1997) categorizes the various types of foreign Investment in Nigeria into five: wholly foreign owned; joint ventures; special contract arrangements; technology management and marketing arrangements; and sub contract co-production and specialization. Ogunkola and Jerome (2004) assessed the magnitude, direction and the prospects of FDI in Nigeria. They noted that while the FDI regime in Nigeria was generally improving, some serious deficiencies remain. These deficiencies are mainly in the area of corporate environment (such as corporate law, labour law, etc.) and institutional uncertainty, as well as the rule of law. The establishment and the activities of the Economic and Financial Crimes Commission, the Independent Corrupt Practices and Other related offences Commission, and the Nigerian Investment Promotion Commission are efforts to improve the corporate environment and uphold the rule of law.

**Determinants of FDI**

With the increasing awareness of incessant inflow of FDI to Nigeria and other developing countries, it is pertinent to examine conceptual issues on various factors that attract FDI to a country.

**1) Size of the market**

Economic studies comprising a cross section of countries indicate a well-established connection between FDI and the size of the market (proxied by the size of the GDP) as well as some of its characteristics (for example, average income levels and growth rate). Some studies found GDP growth rate to be a significant explanatory variable, while GDP was not, probably indicating that where the current size of national income is very small, increments may have less relevance to FDI decisions than growth performance, as an indicator of market potential. Though Bhattacharya, Montiel, and Sharma, (1998) identified GDP growth as a major factor of attraction of FDI in sub-Saharan Africa, small market size need not be a constraint in the case of resource-endowed, export oriented economies like Nigeria, even the experience of India, Pakistan and, to an extent, Bangladesh, have shown that market size notwithstanding, they receive proportionately relative small (below 1%) FDI flows.

**2) Openness**

Whilst access to specific market based on their size and growth is important, domestic market factors are predictably much less relevant in export-oriented foreign firms. A range of research suggests a widespread perception that “open” economies encourage more foreign investment. One indicator of openness is the relative size of the export sector. Singh and Jun (1995) indicates that exports, particularly manufacturing exports, are a significant determinant of FDI flows and their tests show that there is strong evidence that exports precede FDI flows.

**3 ) Low cost of Productivity**

Empirical research has also found relative labour costs to be statistically significant, particularly for foreign investment in labour-intensive industries and for export-oriented subsidiaries. The rapid growth of FDI in Vietnam has also been attributed primarily to the availability of low-cost labour. In India, in contrast, labour market rigidities and relatively high wage in the formal sector have been reported as deterring any significant inflows into the export sector in particular. However, when the cost of labour is relatively insignificant (when wage rates vary little from country to country), the skills of the labour force are expected to have an impact on decisions about FDI location. Productivity levels in sub-Saharan Africa are generally lower than other low-income countries, hence, the low flow of FDI. Indeed, other factors that can account for inflow of FDI to a particular country include political risk or the institutional and governance factor, state of infrastructure, incentives, and privatization policy.

A simple conceptual model that diagrammatically shows the link among the key variables of this study is shown in figure 2.1 below.

***Figure 2.1: Conceptual Model describing interactions of the variables***

**Independent Variables Dependent Variables**

**FDI**

**TELECOMS**

**TELECOMS**

**GDP**

**FDI**

**TELECOMS**

**TELECOMS**

**GDP**

**GDP**

**FDI**

**TELECOMS**

**TELECOMS**

***Source: Researcher’s view, 2017***

The model above shows that each of the independent variables potentially has effect on economic growth (GDP). The extent of economic growth in a country theoretically or potentially account for subsequent growth in telecoms sector, and attracting more of FDI inflows. The model therefore suggests that there will be bi-directional relationships between GDP and FDI and Telecoms and GDP. The thin arrow shows that FDI has impact/link on/with telecoms. The interaction effects of both FDI and telecoms on GDP are also possible. It is this simultaneous interaction of FDI on economic growth in Nigeria through the telecommunications sector that is the main thrust or focus of this thesis. These interactions and effects are examined in the econometric specification of the model with empirical results.

**2.2 Theoretical Review**

Theories relating to Foreign Direct Investment with growth of communications sector and economic growth generally are reviewed.

**2.2.1 Theories of Economic Growth**

**The Neoclassical Growth Theory: Harrod-Domar Growth Model**

When it comes to the issue of classical growth model, Harrod (1939) and Domar (1946) assign a key role to investment in the process of economic growth. To these authors, investments create incomes (demand effects of investment) and increase the productive capacity of the economy by increasing its capital stock (supply effect of investment) in as much as net investment continue to expand. One of the tenets of Harrod-Domar (H-D) theory is that to maintain a full employment equilibrium level of income from yearly, it is necessary that both real income and output should keep expanding. Otherwise, any divergence between the two will lead to excess or idle capacity, thus forcing entrepreneurs to curtail their investment expenditures. Ultimately, it will adversely affect the equilibrium path of the steady state of growth of the economy. Also, for full employment to be maintained in the long run, net investment should expand continuously. This further requires continuous growth in real income at a rate sufficient enough to ensure full capacity use of a growing stock of capital.

**The Neoclassical Growth Theory: The Solow Growth Model**

In the neo-classical growth fashion, the Solow Growth Model expanded the Harrod-Domar Model which stressed the critical role of savings, investment and capital accumulation. Solow-Swan Model (SSM) basically formalized and expanded the Harrod Model by adding labor, capital, and technology. Technology sought to explain the “residual” factor, and was assumed to be determined *exogenously.* In this model, based on diminishing returns to capital, economies will eventually reach a point where any increase in capital will no longer create economic growth. This point is called a "steady state". The model also notes that countries can overcome this steady state and continue growing by inventing new technologies. In the long run, output per capita depends on the rate of saving, but the rate of output growth should be equal for any saving rate. In this model, the process by which countries continue to grow despite the diminishing returns is "exogenous" and represents the creation of new technology that allows production with fewer resources. Some of the key development Policy implications of the SSM is that output (GDP) grows as a result of three (3) factors: (1) increase in labor quantity and quality, (2) increase in capital (by saving & investment), and (3) by technological progress. By implication as well, Closed Economies grow more slowly than Open Economies, and overall, impeding free trade and foreign investment will slow economic growth.

**The Big Push and the Schumpeterian Growth Model**

Contrary to SSM however, the Big Push Theory (BPT) suggests that countries needed to jump from one stage of development to another through a virtuous cycle, in which large investments in infrastructure and education coupled with private investments would move the economy to a more productive stage, breaking free from economic paradigms appropriate to a lower productivity stage. On this note also, Schumpeterian growth model sees growth as a process of creative destruction, which captures the dual nature of technological progress. To achieve this, they make old technologies or products obsolete. This destruction is referred as the annulment of previous technologies which makes them obsolete. Theoretically, the aggregate improvement will translate into economic growth.

**2.2.2 Theories on FDI-Economic Growth Linkage**

Foreign direct investments are external sources of capital that augment or contribute to domestic growth in most developing countries. Theoretically, there are numerous economic theories that evaluate the role of FDI in the country both from positive and negative points of view. Economic theories like neo-classical theory, dependency theory, and endogenous growth model theory are the major ones.

**The Neoclassical**

From the Neoclassical perspective, FDI is a capital investment that economic growth requires for a long term increase in output. This implies that output based on a basic principle in economics, suggests that economic growth requires capital investment in the form of long-term commitment (Adam, 2009). This theory creates a better relationship between the FDI and economy development of every society, in particular, developing countries.

**Dependency Theory**

Theoretically, dependency theory is used in the conceptualization of the impact of FDI inflow to recipient of such FDI. The dependency theory is rooted in Marxist thought and rejects the Modernization Theory’s assertion that all societies progress through similar stages of development and that today’s underdeveloped states are experiencing a similar situation as today’s developed states and therefore need investment, technology transfer, and closer integration with the developed states to accelerate their development.

The dependency school groups countries into centre (the developed, industrialized North) and the periphery (the underdeveloped agricultural South), and that the relationship between these two is determined by the structure of the world economy. The Dependency Theory postulate that the poverty and underdevelopment in the peripheral or Third World Countries is as a result of the integration of peripheral economies with that of the centre (Amit, 2010; McLean & McMillan, 2009). The Dependency Theory originated in Latin America in the 1940’s but in the1960’s was commonly applied to Africa and other Third World Countries.

The Dependency Theory is premised on the belief that:(a) Poor nations provide natural resources, cheap labour, a destination for obsolete technology, and markets to the wealthy nations;(b) Wealthy nations actively perpetuate a state of dependency multifaceted means such as education, sports, economic, media control, politics, banking & finance and human resource development. (c) Wealthy nations actively counter attempts by dependent nations to resist their influences by economic sanctions and/or the use of force.

On the whole, dependency is sustained by the exploitative practice of Multinational Enterprises (MNEs) creating dependent industrialization which destroys local entrepreneurship and technological innovation. The dependent economic are worse off because the profits of (MNEs) are repatriated. Again, foreign firms usually gain control of key industrial sectors leaving the local firms to operate in capital markets. More so, capital-intensive rather than labour – intensive method of production is introduced thereby causing unemployment. This theory also encouraged an international division of labour between the high technology of the core and the low technology of the periphery; it hampers self-sustaining development based on local resources and initiatives. It increases unemployment and corrupts the labour market because the Multinational Enterprises (MNEs) pay higher wages to workers than domestic employers.

Furthermore, Aremu (2005) hold that dependency theory explains the reason for poorness of developing countries which are based on imperial neglect; overdependence upon primary products as exports to developed countries; foreign investors malpractices, particularly through transfer of price mechanism; foreign firm control of key economic sectors with crowding-out effect of domestic firms; implantation of inappropriate technology in developing countries; introduction of international division of labour to the disadvantage of developing counties; prevention of independent development strategy fashioned around domestic technology and indigenous investors; distortion of the domestic labour force through discriminatory remuneration; and reliance on foreign capital in form of aid that usually aggravated corruption (Umah, 2007). Explaining further the dependency theory, FDI are argued to be more exploitative and imperialistic in nature, thus ensuring that the host country absolutely depends on the home country and her capital (Anyanwu, 1993). Based on the framework of this theory, FDI is potentially devastating to economic growth of the developing countries.

**Endogenous growth Theory or New growth Theory**

While the neoclassical theory holds the notion that long term investment is a great determinant of the economic growth of the country, endogenous growth theory explained that physical investment is not a measure of economic growth of a country but the effectiveness and efficient in the use of these investments. Economic models of endogenous growth have been applied to examine the effects of FDI on economic growth through the diffusion of technology (Barro, 1991). Romer (1990) argues that FDI propels economic growth through strengthening human capital, the most essential factor in Research and Development effort; while Grossman and Helpman (1991) emphasize that an increase in competition and innovation will result in technological progress and increase productivity and, thus, promote economic growth in the long run. This however suggests that FDI is growth enhancing.

**2.2.3 Theories on Telecom-Economic Growth Nexus**

Two schools of thought explain the relationship between telecommunication and economic growth. These are the **Technophiles** and the **Technophobic.** The technophiles believes that telecommunication has a positive effect on growth. They argued that ICT will expand productivity, improve employment and upgrade the quality of work in many occupations. Moreover, ICT will offer many opportunities for small scale, independent and decentralized form of production (Posu, 2006). The technophobia regards telecommunication as having a negative effect on economic growth and widening the information gap between the rich and the poor, the literate and the illiterate. While admitting that ICTs could have profound changes on a society, Van Dijk (1999) believes that applications of ICTs and their transformative nature have been greatly exaggerated. They may destroy more jobs than they create; the gap between the rich and the poor may widen. Mansell (1999) saw the huge capital investments required on ICTs as diverting resources from other sectors of the economy that could have greater growth impacts.

There are various economic theories that elaborates more on how technological advancement, telecommunications can bring about economic growth. The Technology Determinism Theory (Smith & Marx, 1994), society’s cultural values, social structure and history are all technology driven. The theory posits that, rather than social context shaping technology, the uses of technology determine the growth and development of the society. This implies that technology dictate users’ behaviour and action (Green, 2001). The implications of this postulate; is that cell phones (technology) exert large influence on the behaviour of people including members of the family.

**2.2.4 Theory Adopted for the Study**

Endogenous Growth Theory

This theory was developed in the 1980’s as a response to criticisms from the neoclassical growth model. It is also referred to as New Growth theory which holds that policy measures can have an impact on the long run growth rate of an economy. The main implication on recent growth theory is that policies which embrace openness, competition, change and innovation will promote growth. Conversely, policies which have the effect of restricting or slowing change to project or favour some particular industries or firms are likely over time to slow growth to the disadvantage of the community. New capacity is more efficient because of new technology, improved methods and economies of scale. This leads to further price reductions, which further increases demand, until markets become saturated due to diminishing marginal utility. The endogenous growth theory includes a mathematical explanation of technological advancement and incorporated a new concept of human capital, the skills and knowledge that make workers productive. Unlike physical capital, human capital has increasing rates of return.

The above issues raised by the authors in this endogenous growth framework is relevance to this present study because it is through Research and Development that innovations comes in that propel competition, while technological diffusion is what is driving the telecommunication sector nowadays. Therefore, this study will adopt Endogenous Growth Model, because the study is on economic growth and geared towards the analysis of macro-econometric variables.

**2.3**  **Empirical Review**

Several scholars have established different evidence based on data in their research on the relationship between FDI and economic growth. Some of these studies are country case study while others are cross country studies (combination of two or more countries).

**2.3.1 Review of Empirical studies in the Developed Economies**

Similar to those scholars that found significant empirical evidence on the relationship between FDI and economic growth, other scholars also found that there is positive relationship between telecom sector productivity and overall economic growth. Jorgenson (2001) study for the United State showed that investment in information technology (IT) contributed more than one-half of the recent increase in the US economic growth. His finding was supported in another work by Kraemer and Dedrick (2001) who, using data from 43 countries, found that the growth in IT investment is correlated with productivity growth. Oulton (2002) study of the United Kingdom showed that in the beginning and later part of 1990s, Information and communications Technology’s (ICT) contribution to GDP growth was 0.36% and 0.57% respectively.

CEPII (2003) study on France showed that in the early 1990s to the mid-1990s, ICT’s contribution to capital growth increase from 0.25% to 0.45%. Cronin, Parker, Colleran and Gold (1991) used the Granger, Simultaneous equations modeling and modified Sims tests to confirm the existence of feedback process in the economic activity and growth stimulates demands for telecommunications services. They believe that as the economy grows, more telecommunications facilities are needed to conduct the increased business transactions. Gupta, (2000) found an estimate that 1% growth in telecommunications services generates 3% growth in the economy. Madden and Savage (1998) analyzed the relationship between telecommunications infrastructure investment and economic growth by taking a sample of transitional economies in central and Eastern Europe and the study shows mutual causality between telecommunications investment and real economic growth at the aggregate level.

**2.3.2 Review of Empirical Studies in the Developing Economies**

On the part of cross country study, Chowdhury and Mavrotas (2006) examined the causal relationship between FDI and economic growth by using time-series data covering the period 1969-2000 for Chile, Malaysia and Thailand. The study used the Toda and Yamamoto causality test approach. Their findings revealed that GDP causes FDI in the case of Chile and not vice versa, while for both Malaysia and Thailand, there is strong evidence of a bi-directional causality between the two variables. Still on the determination of causal link among FDI, trade and output level, Cuadros and Alguaci (2001) studied the nature of the causal relationship between output level, inward foreign direct investment and trade in Latin American countries; Argentina, Brazil and Mexico from the middle seventies to 1997. Utilizing a vector auto-regressive (VAR) model the result of the study suggests a significant impact of foreign direct investment on economic growth and trade in the analyzed countries.

In another line of study, Makki and Somwaru (2004) analyzed the role FDI and trade in economic growth of developing countries within the endogenous growth-theory framework. The study used cross-section data relating to a sample of 66 developing counties over three decades. Findings revealed that FDI and trade contribute toward advancing economic growth in developing countries and that foreign direct investment is often the main channel through which advanced technology is transferred to developing countries.

Bailliu and Jeannine (2000) used panel data from 40 developing countries from 1975–95. The study specified a model which accounted for potential endogeneity of the explanatory variables and the result shows that capital inflows foster higher economic growth, above and beyond any effects on the investment rate, but only for economies where the banking sector has reached a certain level of development. In a similar study, Lumbila (2005) examined a panel analysis of the effects of foreign direct investment (FDI) on economic growth from 47 African countries over two decades (1980–2000). Utilizing a seemingly unrelated regressions (SUR) technique of analysis the study revealed that foreign direct investment exerts a positive impact on growth in Africa.

Using data from several investor surveys, Asiedu (2002) carried out a research on the Determinants of Foreign Direct Investment to developing countries using time series data covering the period 1970-2003. The empirical result suggested that macroeconomic instability, investment restrictions, corruption and political instability have a negative impact on foreign direct investment (FDI) to Africa. Alfaro, Chanda, Kalemli-Ozcan, and Sayek, (2006) analyzed the role of local financial market in enabling FDI to promote growth through background linkages. They asserted that to operate intermediate firms in the goods sector, the entrepreneur requires upfront capital investments. The more developed the local financial markets is, the easier it is for credit constrained firms to operate, the increase in the qualities and quantities of intermediate goods, leads to positive spillovers to the final good sector. Due to this, the financial markets ensure the backward linkages between foreign and domestic firms turn into FDI spillovers. Their results indicate that holding foreign investment constant, financially well developed economies perform almost as twice as economies with poor financial market in terms of growth.

Tang, Salvathan and Selvanathan, (2008) exploited the casual link between FDI, domestic investment and economic growth in China between 1988 and 2003 using the multi-variance VAR and ECM. Their results indicate that there is a bi-directional casualty between domestic investment and economic growth while there is a single- directional causality from FDI to domestic investment and to economic growth.

Evidence from a cross country perspective by Harrison (1994), using a case study of Morocco and Venezuela indicates that firms with foreign equity participation are more productive than domestic firms and have higher productivity growth. However, she finds that in Venezuela the productivity of domestic competitors was hurt because the presence of multinational enterprises (MNEs) decreased their market share. Weinhold and Klass (1991) also find few technological spillovers to domestic companies from Japanese firms operating in Mexico, due mostly to a lack of local sourcing.

**2.3.3 Review of Empirical Studies in Nigeria**

Adeleke, Olowe and Fasesin (2014), examined the impacts of foreign direct investment on Nigeria economic growth and their findings revealed that economic growth is directly related to inflow of foreign direct investment and it is also statistically significant at 5% level which implies that a good performance of the economy is a positive signal for inflow of foreign direct investment. This implies that foreign direct investment is an engine of economic growth.

Similarly, Omankhanlen, (2011) examined the effect of FDI on the Nigerian economy over the period 1980-2009. He assessed the plausibility of Balance of Payment (BOP), Inflation and Exchange rate as determinants of FDI. The study found that foreign direct investments have positive and significant impact on current account balance in Balance of payment while inflation did not have significant impact on foreign direct investment inflows.

Furthermore, Eravwoke and Imide (2013) analyzed corruption, foreign direct investment and its impact on exchange of the Nigerian economy. The ultimate objective of their study centers on an empirical investigation of the impact of corruption, and FDI on exchange rate of the Nigerian economy. In order to achieve these objectives, the study used the ordinary least squares regression analyses, augmented dickey fuller (ADF) unit root test and the co-integration test. The unit root test revealed that all the variables were stationary at first difference and the short run result revealed that corruption which is very high in Nigeria has helped to depreciate the currency of the country with regards its exchange rate of other currencies.

Saibu and Keke (2014) examined the impact of FDI on economic growth using annual time series data from the Nigerian economy. The paper employed Co-integration and Error Correction Mechanism (ECM) techniques to empirically analyze the relationship between foreign private investment and economic growth and to draw policy inferences on the observed relationship. The study revealed that there was a substantial feedback of 116% and 78% from previous disequilibria between long-run economic growth and FDI respectively. The findings also indicated that a substantial proportion of capital inflow was not productively invested. However the relatively small proportion (22%) of net capital inflows invested, contributed significantly to economic growth in the Nigerian economy. The political environment was found to be unfavorable and overwhelmed the positive impact of foreign private investment.

Olokoyo, (2012) examined the effects of FDI on the development of Nigeria’s economy. The paper tried to answer the questions: what are the FDI determinants in Nigeria and how do they affect the Nigerian economy? The study employed the use of Ordinary Least Square (OLS) regression technique to test the time series data from 1970 – 2007. Hence, using the real GDP data for Nigeria, the result did not provide strong linkage between FDI and economic growth.

Ayashagba and Abachi (2002) investigated the effects of FDI on economic growth from 1980 to 1997. Their result revealed that FDI had significant impact on economic growth in Nigeria. However, the study concluded that the presence of FDI in the LDCs particularly in Nigeria was not totally wasteful.

Otepola (2002) ascertains further that FDI contributes significantly to economic growth through export. Akinlo (2004) investigates the impact of FDI on economic growth. His error correction (ECM) results show that both private capital and logged foreign capital have small and insignificant impact on economic growth. It established the positive and significant impact of export growth, financial development which measured as M2/GDP has significant negative impact on growth. This was attributed to capital flight. In another manner, labour force and human capital were found to have significant positive effects on growth.

However, an important fact about FDI and growth debate is the endogeneity case in which FDI is theorized to impact positively on economic growth and consequently, lead to greater market which in turn attracts further FDI as well (market size hypothesis). Market size hypothesis states that markets with rapidly expanding economic growth tend to give multinational firms more opportunities to make more sales and profits and therefore become attractive to FDI. On this note, Adeolu (2007) analyzed the effects of FDI and Economic growth in Nigeria. The result showed that although the overall effect of FDI on the whole economy may not be significant, the components of FDI positively affect economic growth and therefore FDI needs to be encouraged.

FDI has empirically been found to stimulate economic growth by a number of researchers (Borensztein, De Gregoria & Lee. 1998; Glass & Saggi, 1999). Blomstrom, Lipsey and Zejan (1994) report that FDI exerts a positive effect on economic growth, but that there seems to be a threshold level of income above which FDI has positive effect on economic growth and below which it does not. The explanation was that only those countries that have reached a certain income level can absorb new technologies and benefit from technology diffusion, and thus reap the extra advantages that FDI can offer. In summary, (UNCTAD, 1999) submits that FDI has either a positive or negative impact on output depending on the variables that are entered alongside it in the test equation.

There are a lot of country specific studies also on the relationship between FDI and Economic growth. With particular reference to Nigeria, it has been shown based on the data that Nigeria’s share of FDI inflow to Africa averaged around10%, from 24.19% in 1990 to a low level of 5.88% in 2001 up to 11.65% in 2002 (UNCTAD, 2003). Nigeria was reported by the united nation conference on trade and development (UNCTAD, 2001) to be the continent’s second top FDI recipient after Angola in 2001 and 2002.There have been some studies on investment and growth in Nigeria with varying results and submissions. For example, Odozi (1995) reports on the factors affecting FDI flow into Nigeria in both the pre and post structural adjustment programme (SAP) eras and found that the macro polices in place before the SAP were discouraging foreign investors. This policy environment led to the proliferation of parallel markets and sustained capital flight.

Ogiogio (1995) reports negative contribution of public investment to GDP growth in Nigeria for reasons of distortions. Aluko (1961), Brown (1962) and Obinna (1983) report positive linkage between FDI and economic growth in Nigeria, Endozien (1968) discusses the linkage effects of FDI on the Nigerian economy and submits that these have not been considerable and that the broad linkage effects were lower than the Chenery-Watanabe average (Chenery and Watanabe, 1958). Oseghale and Amonkhienan (1987) found that FDI is positively associated with GDP, concluding that greater inflow of FDI will spell a better economic performance for the country.

Ariyo (1998) studied the investment trend and its impact on Nigeria’s economic growth over the years. He found that only private domestic investment consistently contributed to raising GDP growth rates during the period considered (1970-1995). Furthermore, there is no reliable evidence that all the investment variables included in his analysis have any perceptible influence on economic growth. He therefore suggests the need for an institutional rearrangement that recognizes and protects the interest of major partners in the development of the economy.

Examining the contributions of foreign capital to the prosperity or poverty of LDCs, Oyinlola (1995) conceptualized foreign capital to include foreign loans, direct foreign investments an export earnings using Chenery and Stout’s two-gap model (Chenery and Strout, 1966), he concluded that FDI has a negative effect on economic development in Nigeria. Further, on the basis of time series data, Ekpo (1995) reports that political regime, real income per capital, rate of inflation, world interest rate, credit rating and debt service were the key factors explaining the variability of FDI into Nigeria. Adelegan (2000) explored the seemingly unrelated regression model to examine the impact of FDI on economic growth in Nigeria and found out that FDI is pro-consumption and pro-import and negatively related to gross domestic investment. Akinlo (2004) found that foreign capital has a small and not statistically significant effect on economic growth in Nigeria. Again, Ayanwale and Bamire (2001) assess the influence of FDI on firm level productivity in Nigeria and report a positive spillover of foreign forms on domestic firm’s productivity.

* + 1. **Evidence on Telecommunication-Economic Growth Nexus**

Belaid (2002) is one of the studies on how telecommunications infrastructures reduce transaction cost, increasing TFP (Total Factor Productivity) of the private sector and diffusion of new technologies, which will remedy the problem of the developing countries. According to Rodini, Ward and Woroch (2003), telecommunications has impact on Human and Social capital. Ding and Haynes (2006) investigated the role of telecommunication infrastructure in long-run regional economic growth in China for sample of 29 regions. The study used a dynamic fixed effects model for estimation, which allows testing the relationship between regional economic growth with initial economic condition, fixed investment, population growth as well as telecommunications infrastructures. On the basis of this study, telecommunication is both statistically significant and positively correlated to regional economic growth in China.

Vagliasindi, Izzet and Taubman (2006); Minges (1999); Madden and Coble-Neal (2004); and Okada and Hatta (1999), found out that mobile phones and fixed phones are moderate substitutes and that the lower the penetration rates of fixed phones, the stronger the substitutability between fixed and mobile phones. Critical studies of the influence of telecommunication on various key countries show a positive relationship between telecommunication and economic growth (Jorgenson 2001, Kraemer & Dedrick 2001). Again, Onakoya, Salisu and Oseni (2012) examined the impact of investment in telecom infrastructure on economic growth in Nigeria using a multivariate model of simultaneous equations and found that telecom infrastructural investment has significant impact on the output of the economy.

Posu (2006) used data for the period 1999-2004 to identify the impact of telecommunication on Nigerian economic growth and is covered that about 77% variation in GDP during 1999-2004 is attributable to investment in telecommunication. On the contrary however, an exploratory study of Awoleye, Okogun , Ojuloge , Atoyebi, and Ojo (2012) on socio-economic effects of telecommunication growth in Nigeria between 1999 and 2009 using secondary data from Central Bank Statistical bulletin and world bank development indicators with regression and correlation analysis found mixed evidence as their overall results revealed positive correlation between telecom infrastructural investment and GDP but showed a sign of negative impact on economic growth.

**2.3.5 Evidence of Impact of FDI on Telecommunication Performance**

Indeed, most studies focused on the empirical nexus between FDI and economic growth than the linkage between FDI and telecommunications performance. Few studies that concentrated on the latter are reviewed herein. Opaluwa, Abdullahi, Abdul Mohammed, Okpanachi and Edogbanya (2013) examined the effect of FDI on the growth of the telecommunications sector in Nigeria from 1997 to 2011 using Ordinary Least Square (OLS) method and found that FDI has positive effect on the productivity of the telecommunications sector and it is statistically significant. Similarly, Ezeanyieji and Ifebi (2016) focused on the role played by FDI in the development of the Telecommunications of Nigeria using OLS method. The result showed that FDI has contributed significantly to the performance of the telecom sector in terms of its contribution to the GDP of Nigeria. He recommended that government should focus on maintaining political stability to serve as key to sustainable growth and development of telecom sector in Nigeria.

On the part of Izuchukwu (2014) researched on the empirical relationship between FDI and telecommunications growth in Nigeria between 2001- 2008 using OLS method. He came out with the fact that all variables- consumer, subscribers, private investment and technology have a positive and significant relationship with FDI and concluded that government should improve on the standard of infrastructural facilities to attract more FDI into Nigeria and provide relevant social amenities.

Obi (2014) examined telecommunications reform in china and Nigeria: same result, different strategies where he compared telecom reforms in China and Nigeria. He argued that China’s reform started in late 1970’s and made sufficient impact to change the country’s economic history while Nigeria commenced gradual reform of the industry in the early 1990’s with its dramatic transformation peaking by 2010. Evidently he concluded that the sector in both economies was drastically transformed in a space of two decades with sufficient telecom facilities. Although the results were similar, the strategy adopted by each county was different.

**2.4 Theoretical Framework**

This aspect deals with the explanation of the theoretical framework that establishes the nexus among foreign direct investment (FDI), telecommunications and economic growth in Nigeria. In this case, both the theoretical and conceptual frameworks that connect the variables are described. Consequently, the specification of the deterministic and econometric model for establishing the growth effects of FDI on Nigerian telecommunications sector and economy is put in perspective.

In accounting for the level of economic growth in any country, various sectors cumulatively work together to determine the growth process of the economy. The telecommunications sector is one of such sector. With the global observation that the more or the faster at which people communicates, the more exchange of resources and market expansion, developments of the telecommunications industry have the potential of causing the economy to grow. However, considering the level of low growth and technical inefficiencies, coupled with low domestic investment in the telecommunications in Nigeria, the need for external sources of finance to augment the growth of the sector occupies a paramount position. In other word, the demand for foreign direct investment (FDI) to change the course of various factors that have hindered the pace of economic development in Nigeria, especially the telecommunications is necessary. Inflow of FDI is therefore seen as an important catalyst for economic growth in the developing countries because it affects the economic growth by stimulating domestic investment, increase in capital formation and also, facilitating the technology transfer in the host countries (Falki, 2009). This believe that FDI along other important variables are growth enhancing as Falki (2009) and other scholars observed is consistent with the modern theoretical framework anchored in endogenous growth model. The proponents of this growth model assert that it is the efficiency of the use of investments that matters in growth accounting, not just the physical investment. Using this framework, Romer (1990) argues that FDI propels economic growth through strengthening human capital through Research and Development (R&D). Similarly, Barro (1991) found a significant effect of FDI on economic growth through the diffusion of technology, while Grossman and Helpman (1991) emphasize that an increase in competition and innovation will result in technological progress and increase productivity and, thus, promote economic growth in the long run.

**CHAPTER THREE**

**RESEARCH METHODOLOGY**

This chapter involved methodological procedures regarding the design of the study, data sources and econometric model for establishing the growth effects of FDI on Nigerian telecommunications sector.

**3.1 Research Design**

Research design encompasses the conceptual structure within which research was conducted, the preparation of which is to facilitate research to be as efficient as possible. The design in this study adopted ex-post facto research design, because it found it appropriate for achieving the research objectives, since the study depended on secondary data. This study was designed basically to examine the effects of FDI in telecommunications sector on Economic growth in Nigeria for the period 1985-2015 and this research involved econometric study to explain the dependent variable which is Real Gross Domestic Product (RGDP) while independent variables are Gross Domestic Product in telecommunications sector/ Share of telecoms in total GDP (GDPtel), Foreign Direct Investment inflow to the telecommunications sector (FDItel) and Intervening variables are Gross Capital Formation (GCF), Exchange Rate (EXCHR) Inflation (INFL), Trade Openness (OPEN), Credit Facilities to Private Sectors (CRF) and Dummy for Global System of Mobile Communication (GSMDum)

**3.2 Method of Data Collection**

Data for this study were obtained mainly from secondary sources, particularly from Central Bank of Nigeria (CBN) and other publications such as the CBN statistical Bulletin, CBN Annual Reports and Statements of Accounts of various years. Also consulted was the National Bureau of Statistics annual report for various years. (Appendix I)

**3.3 Measurement of Variables**

**Dependent Variable:** Real Domestic Product (RGDP) and it was measured in millions of naira terms.

**Independent Variable:** Foreign Direct Investment in Telecommunications sector (FDItel) and it was measured in millions of naira terms.

**Intervening Variables are:**

Exchange rate measured at rate of the Nigerian naira to the foreign currencies of the world. (N:$)

Inflation measured by Consumer Price Index (CPI)

Trade openness measured by the sum of exports and imports all divided by GDP

Gross Capital Formation which was measured in millions of naira terms.

Credit to Private sector was measured in millions of naira terms.

**3.4 Method of Data Analysis**

To formally test the hypotheses and examine the effect of foreign direct investment in telecommunications sector on Nigeria’s economic growth; regression analysis – Error Correction Model (ECM) was employed in this study. Since time series variables are used, it is obligatory to examine the properties of the time series data. In order to achieve this, the study utilized popular unit root tests methods, Augmented Dickey-Fuller Test (ADF) and Phillips-Perron (PP). Similarly, to test the hypothesis of no significant difference between Foreign Direct Investment in Telecommunications Sector before and after the introduction of GSM in Nigeria; paired t-test statistics was used. In the analyses, the E-views, version 9.0 was adopted. The Ordinary Least Squares (OLS) estimation technique was used in the single equation models.

**3.5 Unit Root Test**

To determine if a variable is stationary (i.e with zero mean and constant variance) unit root test is usually performed on the variable. This test helps to determine the order of integration of the variable. If the data is stationary at levels or after differencing 1 time, the series is of the order 1(1). The time series characteristic of the variables using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test was examined. Basically, the idea is to ascertain the order of integration of the variables as to whether they are stationary I (0) or non-stationary.

**3.6 Cointegration Analysis**

Cointegration analysis can be used to examine the co-movement between two (more) non- stationary time series. Cointegration is the idea that the linear combinations of non-stationary series can be stationary, implying a long-run relationship, thus they can be modeled. Cointegration analysis was introduced by Engle and Granger in the early 1980s, with improvements and additions made in subsequent years. Cointegration is a modelling process that incorporates non-stationarity with both long-term relationships and short-term dynamics. To examine time series in financial data using cointegration, the time series in its level form should be non-stationary and integrated of order 1, written as I(1). Integrated of order 1 means the series becomes stationary after differentiating it once. Variables are said to be cointegrated if they are I(1) and have a linear combination which is stationary without the need to differentiate the data. Cointegration is the underlying methodology used to analyze the relationships among the variables.

In testing for *Cointegration*, the Johansen Efficient Maximum Likelihood test was used to examine the existence of a long-term relationship among the variables.

**3.7 Error Correction Model**

This is the final specification that includes a short run dynamic process, consistent with data and converging to the long run equilibrium. The Error Correction Model (ECM) attempts to integrate economic theory useful in characterizing long run equilibrium with observed disequilibrium by building a model that explicitly incorporates behaviour that would restore equilibrium. *Error Correction Mechanism* has the cointegrated relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The Error Correction Term (ECT) is the one-period lagged value of the residual from a static model.

In this study therefore, having established the cointegration relationships among variables, an *over-parameterised* error correction model was estimated which initially consisted of 2 lags length of each variable. The over-parameterised error correction model estimated is given in the equation below;

 (1)

Where *Yt* is the dependent variable; *Xt* is a vector of independent variables. All these were found to be cointegrated with the dependent variable while  are stationary residuals from that cointegration static model.

**3.8 Model Specification**

Equation (1) is a single equation of ECM which can also be used in multivariate system. In this study, the variables considered are; Real Gross Domestic Product (RGDP), Gross Domestic Product in telecommunications sector/ Share of telecoms in total GDP (GDPtel), Foreign Direct Investment inflow to the telecommunications sector (FDItel), Gross Capital Formation (GCF), Exchange Rate (EXCHR) Inflation (INFL), Trade Openness (OPEN), Credit Facilities to Private Sectors (CRF) and Dummy for Global System of Mobile Communication (GSMDum)

**Model 1: FDI-Telecommunications Sector Growth Effects**

The dependent variable in this model will be share of telecoms in total GDP while the major independent variable will be FDI inflow to the telecommunications sector. Other controlled explanatory variables will include total GDP in the economy, which as stated in the conceptual model in figure 2. 1 can have impact on the performance of the telecoms sector. Additional controlled variables are Gross Capital Formation (GCF) which measured the existing level of investment in the economy, exchange rate, inflation rate, trade openness of the economy, and credit facilities granted to private sectors to enhance real sector growth. Again, to demarcate the analysis between the pre and post liberalization in the telecom sector that warrant the emergence of GSM, a dummy variable with binary values of 0 and 1 for the period before and after the liberalization was included in the model. The error correction model (ECM) model is explicitly specified as:

(2)

**Model 2: FDI-Telecommunications and Economic Growth Interactions**

In the second model, Real GDP is the dependent variable. However, the dependent variable in equation (2) has become one of the independent variables in equation (3) because it is believed that performance of the telecommunications sector determines overall growth of the economy. Furthermore, FDI inflow to telecom sector interacted with the performance of telecoms sector are jointly put among the independent variables in equation (3) so that FDI impact on the economy via telecoms industry can be estimated. The econometric form of the model is specified as:

(3)

It is expected that the signs of the estimated values for each of these parameters will be positive. That is, in both equation (2) and (3) the independent variables are expected to show sign of positive effects on the performance of the telecommunications sector and economic growth respectively.

Where;

RGDP = Real Gross Domestic Product

GDPtel=Gross Domestic Product in telecommunications sector/ Share of telecoms in total GDP

FDItel= Foreign Direct Investment inflow to the telecommunications sector

GCF= Gross Capital Formation

EXCHR= Exchange Rate

INFL= Inflation

OPEN= Trade Openness

CRF= Credit Facilities to Private Sectors

GSMDum= Dummy for Global System of Mobile Communication

ECT (-1)= Lagged Error Correction Term

0 is the constant

While 1-nrepresents the parameter estimates and e represent the stochastic term.

**3.9 T-test**

The paired sample *t*-test, sometimes called the dependent sample *t*-test, is a statistical procedure used to determine whether the mean difference between two sets of observations is zero. In a paired sample *t*-test, each subject or entity is measured twice, resulting in *pairs* of observations. In examining whether there is significant difference between Foreign Direct Investment in Telecommunications sector before and after the introduction of GSM in Nigeria; the study used the paired t-test statistics.

For analytical purpose the -statistics is specified as:

The statistic is described as Student’s with degrees of freedom

Where, = mean differences

= standard deviation of the sample differences

= number of pairs

**CHAPTER FOUR**

**RESULTS AND DISCUSSIONS**

This chapter presents the results of the analyses of the selected variables as well as some discussions.

**4.1 Data Presentation**

In this chapter, various data adopted for the study was presented and analyzed. It was mentioned in chapter three that the study adopted ex-post facto design and data were generated from selected variables as well as some discussions. It is organized into three broad sections, namely; trend analysis, descriptive analysis, and empirical analysis. The empirical analysis is further divided into two subsections, namely; paired t-test and Error Correction Model (ECM).

# 4.1.1 Trend of Foreign Direct Investment in Telecommunications Sector

The trend of Foreign Direct Investment in Telecommunications sector for the period of study is presented in figure 4.1. The figure shows that the Foreign Direct Investment inflow in telecommunications sector increases from N39.10 million in 1985 to N47, 527.50 million in 2015, even though in nominal terms, it fluctuates between 2007 and 2015 and gets to its peak in 2013 with the value of N85, 606.60 million due to full liberalization of the sector and competition by private operators.

*Source: Author’s Computation, 2017.*

Figure 4.1: Trend of Foreign Direct Investment in Telecommunications Sector

# 4.1.2 Trend of Contribution of Telecommunications Sector to Gross Domestic Product

Figure 4.2 presents the trend of contribution of Telecommunications Sectors to Gross Domestic Product for the period of study. The figure shows that the contribution of Telecommunications Sector to Gross Domestic Product rises from N18, 452.43 million in 1985 to N5,933, 089.01 billion in 2015. However, the trend depicts a relatively steady movement between the years 2010 and 2011 with the values of N4, 931, 991.14 billion and N4, 992, 420.11 billion respectively.

*Source: Author’s Computation, 2017.*

Figure 4. 2: Trend of Contribution of Telecommunications Sectors to Gross Domestic Product

# 4.1.3 Descriptive Result

Descriptive result of the variables used in this study is presented in table 4.1.3. From the table, Real Gross Domestic Product (RGDP) has a minimum value of N14,953,913.05b and a maximum of N69,023,929.94b, with the mean value of N32, 821,097.29b and a standard deviation of N17, 311,753.22b. Foreign Direct Investment in telecommunication sector (FDItel) ranges from N39.10m to N85,606.60m with an average value of N9,346.72m and a standard deviation of N20,602.99m. Contribution of Telecommunications sector to Gross Domestic Product (GDPtel) has a minimum value of N18,329.74m with maximum at N5,933,089.01b. The mean value is found to be N1,472,057.38b while the standard deviation is N2,123,729.77b. The Exchange Rate (Exchr) is found to be between 0.89 and 196.99 with a mean value of 88.55 and standard deviation of 61.07. Inflation (Infl) is minimum at 0.22 and maximum at 76.76. The mean Inflation value is found to be 20.14 and the standard deviation is19.76. Gross Capital Formation (GCF) is found to be between N8,799.48m and N4,254,488.23b with a mean value of N1,203,689.52b and standard deviation of N1,529,538.05b. Trade Openness (OPEN) ranges from 0.07 to 31.45 with a mean value of 10.41 and standard deviation of 9.54. Credit Facilities to Private Sector (CRF) has a minimum value of N13,070.34m and maximum value of N18,674,147.78b. The mean value was found to be N3,794,313.51b and standard deviation of N5,870,433.17b.

TABLE 4. 1.3: Descriptive Result

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Count** | **Minimum** | **Maximum** | **Mean** | **Standard Deviation** |
| ***RGDP*** | 31 | 14,953,913.05 | 69,023,929.94 | 32,821,097.29 | 17,311,753.22 |
| ***FDItel*** | 31 | 39.10 | 85,606.60 | 9,346.72 | 20,602.99 |
| ***GDPtel*** | 31 | 18,329.74 | 5,933,089.01 | 1,472,057.38 | 2,123,729.77 |
| ***EXCHR*** | 31 | 0.89 | 196.99 | 88.55 | 61.07 |
| ***INFL*** | 31 | 0.22 | 76.76 | 20.14 | 19.76 |
| ***GCF*** | 31 | 8,799.48 | 4,254,488.23 | 1,203,689.52 | 1,529,538.05 |
| ***OPEN*** | 31 | 0.07 | 31.45 | 10.41 | 9.64 |
| ***CRF*** | 31 | 13,070.34 | 18,674,147.78 | 3,794,313.51 | 5,870,433.17 |

*Source: Author’s Computation, 2017.*

# 4.1.4 Unit Root (Stationary) Test

The summary of unit root results regarding the order of integration based on Augmented Dickey- Fuller (ADF) and Phillips-Perron (PP) tests are presented in table 4.1.4. The null hypothesis is that the variables have unit root that are not stationary while the alternative hypothesis negate the assertion. However, the decision rule is to reject the null hypothesis if the absolute value of the ADF statistic value exceeds the critical value at a chosen level of significance.

The summarized result presented in the table shows that at various levels of significance (1%, 5%), the variables were found to be non – stationary (unit root) at level. However, each of the variables is integrated of order 1(1). The study proceeds to carry out the cointegration test to determine if a long run equilibrium relationship exists between the regressand(s) and the regressor (s) in the models specified.

TABLE 4.1.4: Stationary Test Result

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **At Levels** | | | | | **At First Difference** | | | |  |  |
| Variable | ADF-Test Statistic | Critical Value at 1% | Critical Value at 5% | Remark | Probability | ADF-Test Statistic | Critical Value at 1% | Critical Value at 5% | Remark | Order of Integration | Probability |
| Log(RGDP) | 0.390 | -3.679 | -2.968 | NS | 0.979 | -3.102 | -3.679 | -2.968 | S | I (1) | 0.038 |
| Log(GDPtel) | 0.043 | -3.670 | -2.940 | NS | 0.955 | -4.953 | -4.310 | -3.574 | S | I (1) | 0.002 |
| Log(FDItel) | -0.211 | -3.711 | -2.981 | NS | 0.925 | -3.386 | -3.711 | -2.981 | S | I (1) | 0.021 |
| Log(EXCHR) | -3.037 | -3.724 | -2.986 | NS | 0.045 | -5.213 | -3.679 | -2.968 | S | I (1) | 0.000 |
| Log(GCF) | -1.933 | -4.339 | -3.588 | NS | 0.610 | -5.951 | -4.324 | -3.581 | S | I (1) | 0.000 |
| Log(CRF) | -0.784 | -3.670 | -2.964 | NS | 0.809 | -4.248 | -3.679 | -2.968 | S | I (1) | 0.003 |
| INFL | -2.554 | -4.340 | -3.588 | NS | 0.302 | -5.523 | -4.441 | -3.633 | S | I (1) | 0.001 |
| OPEN | -1.246 | -3.670 | -2.964 | NS | 0.640 | -3.857 | -3.679 | -2.968 | S | I (1) | 0.007 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | At Levels | | | | | At First Difference | | | |  |  |
| Variable | PP-Test Statistic | Critical Value at 1% | Critical Value at 5% | Remark | Probability | PP-Test Statistic | Critical Value at 1% | Critical Value at 5% | Remark | Order of Integration | Probability |
| Log(RGDP) | 1.182 | -3.670 | -2.964 | NS | 0.997 | -3.121 | -3.679 | -2.968 | S | I (1) | 0.036 |
| Log(GDPtel) | -0.003 | -4.297 | -3.568 | NS | 0.598 | -4.954 | -3.679 | -2.968 | S | I (1) | 0.000 |
| Log(FDItel) | -0.958 | -3.670 | -2.964 | NS | 0.755 | -13.300 | -3.711 | -2.981 | S | I (1) | 0.022 |
| Log(EXCHR) | -4.324 | -4.297 | -3.568 | NS | 0.195 | -5.212 | -3.679 | -2.968 | S | I (1) | 0.000 |
| Log(GCF) | -1.017 | -4.297 | -3568 | NS | 0.927 | -5.575 | -4.320 | -3.574 | S | I (1) | 0.000 |
| Log(CRF) | -0.800 | -3.670 | -2.964 | NS | 0.805 | -4.108 | -3.679 | -2.968 | S | I (1) | 0.004 |
| INFL | -3.174 | -4.297 | -3.568 | NS | 0.109 | -6.849 | -4.310 | -3.574 | S | I (1) | 0.000 |
| OPEN | -1.344 | -4.297 | -3.569 | NS | 0.820 | -3.872 | -3.679 | -2.968 | S | I (1) | 0.007 |

*Source: Author’s Computation, 2017.*

# 4.1.5 Cointegration Test

In table 4.1.5, the co-integration result which tests the null hypothesis of no co-integration against the alternative that co-integration exists among variables the cointegration rank test is reported with the trace statistic and maximum-eigenvalue statistic. At 5% level of significance, the trace statistic indicates at most three (3) cointegrating equations. One cointegrating relation is enough to prove that long-run relationship exists in the model. Since the variables are cointegrated, there is, hence, a long run relationship among the variables.

TABLE 4.1.5: Summary Result on Co-integration Test

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No. of CE(s)** | **Eigenvalue** | **Trace Statistic** | **Critical Value** | **Prob.\*\*** | **Eigen value** | **Max\_Eigen Statistic** | **Critical Value** | **Prob.\*\*** |
| None\* | 0.953964 | 250.5622 | 159.5297 | 0.0000 | 0.953964 | 89.27144 | 52.36261 | 0.0000 |
| At most1\* | 0.825481 | 161.2907 | 125.6154 | 0.0001 | 0.825481 | 50.62590 | 46.23142 | 0.0159 |
| At most2\* | 0.763688 | 110.6649 | 95.75366 | 0.0032 | 0.763688 | 41.83541 | 40.07757 | 0.0314 |
| At most 3 | 0.582688 | 68.82944 | 69.81889 | 0.0598 | 0.582688 | 25.34371 | 33.87687 | 0.3621 |
| At most 4 | 0.535547 | 43.48573 | 47.85613 | 0.1212 | 0.535547 | 22.23994 | 27.58434 | 0.2083 |
| At most 5 | 0.340126 | 21.24579 | 29.79707 | 0.3425 | 0.340126 | 12.05546 | 21.13162 | 0.5422 |
| At most 6 | 0.270739 | 9.190327 | 15.49471 | 0.3481 | 0.270739 | 9.155980 | 14.26460 | 0.2734 |
| At most 7 | 0.001184 | 0.034348 | 3.841466 | 0.8529 | 0.001184 | 0.034348 | 3.841466 | 0.8529 |

*Source: Author’s Computation, 2017.*

 Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

 \* denotes rejection of the hypothesis at the 0.05 level

 \*\*MacKinnon-Haug-Michelis (1999) p-values

# 4.1.6 Paired T- Test

Table 4.1.6 presents a paired sample t-test analysis result on Foreign Direct Investment in Telecommunications (FDItel) in Nigeria between 1985 to 1999 (pre-GSM era) and 2001 to 2015 (within-GSM era) There is strong evidence (|t| = 2. 690) that the introduction of GSM significantly affects Nigeria’s Foreign Direct Investment inflow in telecommunications sector. The result shows average values of N361.17m and N18, 900.70m before and within the introduction of GSM respectively with corresponding standard deviations of N239.21m and N26, 833.76m respectively. These indicate that the sector has experienced speedy change overtime. The result suggests the acceptance of the alternative hypothesis (H1) and concludes that there is significant difference between Foreign Direct Investment in Telecommunications (FDItel) in Nigeria between pre and within- GSM era.

TABLE 4.1.6: Paired t-test Result

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Obs** | **Mean** | **Std. Err.** | **Std. Dev.** |
| FDI\_Before GSM | 15 | 361.1733 | 61.76611 | 239.2191 |
| FDI\_Within GSM | 15 | 18900.7 | 6928.447 | 26833.76 |
| Diff. | 15 | -18539.53 | 6891.687 | 26691.39 |
|  | | | | |
| Degree of Freedom | 14 | | | |
| t-Statistic | -2.690 | | | |

*Source: Author’s Computation, 2017.*

# 4.1.7 Error Correction Model (ECM)

## Model 1

Table 4.1.7 presents the parsimonious ECM result that shows the impact of Foreign Direct Investment in Telecommunications Sector (FDItel) and other variables on Contribution of Telecommunications Sectors to Gross Domestic Product (GDPtel). From the table, the statistical significance of the coefficient of error correct term, ECT (-0.258), indicates that there exists short- t-1, run relationship among the time series variables used in the study. The sign and value of the coefficient provide information about the speed of convergence or divergence of the variables from their long-run cointegrating equilibrium. Negativity of the coefficient of ECT along with its significance is considered favorable for the stability of long-run equilibrium.

F-statistic value of 7.011 (P=0.0003) rejects the null hypothesis that the independent variables are jointly not statistically significant in explaining variations in GDPtel, on this ground the study accepts the alternative hypothesis and concludes that the independent variables jointly affect GDPtel. The Adjusted R-square value (0.720) shows that the independent variables account for about 72.0% variations in contribution of Telecommunications Sectors to Gross Domestic Product. This also implies that the model has a good fit. Durbin-Watson statistics (DW) value of 2.189 implies that there is absence of autocorrelation in the model.

Generally, the result shows that current value of GSMDum and one time period ago of GDPtel FDItel, OPEN and CRF are statistically significant in affecting the current value of the contribution of Telecommunications Sectors to Gross Domestic Product (GDPtel). Specifically, positive and significant relationship exist between current GSMDum, one time period ago of FDItel, OPEN, CRF and current GDPtel at 1%, 5%, 1% and 1% levels of significance respectively. These imply that, 1 percent increase in one lag of FDItel, and CRF will induce 0.160 and 2.880 percents change in GDPtel respectively. Also, a unit change in GSMDum or one lag of OPEN will induce 83.1 or 2.8 percents change in GDPtel. Conversely, a significant but negative relationship exists between one lag of GDPtel and current GDPtel. This implies that a percent increase in one time past value of GDPtel will lead to 5.324 percent decrease in GDPtel. These mean that GSMDum and one time period age of GDPtel FDItel, OPEN and CRF are major determinants of contribution of Telecommunications Sectors to Gross Domestic Product (GDPtel) in Nigeria.

TABLE 4.1.7: Error Correction Model (ECM)

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Coefficient** | **Std. Error** | **Prob.** |
| D(LOG\_FDITEL) | 0.14687\* | 0.078 | 0.076 |
| D(LOG\_EXCHR) | -0.14488 | 0.194 | 0.467 |
| D(INFL) | -0.00041 | 0.001 | 0.748 |
| D(LOG\_CRF) | -0.05151 | 0.339 | 0.881 |
| GSMDUM | 0.83117\*\*\* | 0.101 | 0.000 |
| D(LOG\_RGDP) | 0.15860 | 2.143 | 0.942 |
| D(LOG\_GDPTEL(-1)) | -5.32443\*\*\* | 0.686 | 0.000 |
| D(LOG\_FDITEL(-1)) | 0.15988\*\* | 0.073 | 0.043 |
| D(LOG\_GCF(-1)) | 0.17845 | 0.277 | 0.528 |
| D(OPEN(-1)) | 0.02833\*\*\* | 0.008 | 0.004 |
| D(LOG\_CRF(-1)) | 2.87981\*\*\* | 0.499 | 0.000 |
| ECT(-1) | -0.25797\*\*\* | 0.069 | 0.002 |
| C | 5.33434\*\*\* | 0.692 | 0.000 |
|  | | | |
| R-squared | 0.840 | | |
| Adjusted R-squared | 0.720 | | |
| F-statistic | 7.011 | | |
| Prob(F-statistic) | 0.0003 | | |
| Durbin-Watson stat | 2.189 | | |

*Source: Author’s Computation, 2017.*

*Note: \*, \*\* and \*\*\* represents significance level of 10%, 5% and 1% respectively.*

## 4.1.7.1 Model 2

Table 4.1.7.1 presents the parsimonious ECM result that shows the impact of Foreign Direct Investment in Telecommunications Sector (FDItel), Contribution of Telecommunications Sectors to Gross Domestic Product (GDPtel) and other variables on economic growth. The F-statistic value of 3.982 (P<0.005) rejects the null hypothesis that the independent variables do not impact on economic growth, thus we accept the alternative hypothesis that the independent variables impacts on economic growth. The Adjusted R-square value (0.539) shows that the independent variables account for about 54.0% variation in economic growth. Based on this we conclude that the model has a good fit. The Durbin-Watson statistics (DW) value is 1.934 (approximately to 2). This implies that the model is free from auto-correlation problem. The ECT term is rightly signed (negative), it is less than one and statistically significant at 1% level of significance.

In general, current GSMDum is significant determinants of current level of economic growth. Specifically, the result shows that GSMDum exhibit positive and significant relationship with current RGDP at 1% levels of significance. This implies that 1 unit increase in GSMDum will induce 4.85 percent increase in current RGDP. Also, one unit rise in GSMDum will induce 0.023 percent fall in economic growth (RGDP). These mean that during the period of study, GSMDum is the major driver of economic growth.

TABLE 4.1.7.1 : Error Correction Model (ECM)

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Coefficient** | **Std. Error** | **Prob.** |
| D(LOG\_GDPTEL) | 0.03265\* | 0.017 | 0.071 |
| D(LOG\_FDITEL) | 0.00464 | 0.007 | 0.530 |
| D(LOG\_GDPTEL)\*D(LOG\_FDITEL) | 0.13579 | 0.146 | 0.366 |
| D(LOG\_GCF) | 0.03302 | 0.027 | 0.234 |
| D(LOG\_EXCHR) | -0.04019\* | 0.020 | 0.058 |
| D(INFL) | -0.00023\* | 0.000 | 0.074 |
| D(OPEN(-1)) | 0.00046 | 0.001 | 0.562 |
| GSMDUM | 0.04890\*\*\* | 0.013 | 0.001 |
| D(LOG\_RGDP(-1)) | 0.20288 | 0.197 | 0.318 |
| D(LOG\_CRF(-1)) | 0.00726 | 0.032 | 0.822 |
| ECT(-1) | -0.08457\*\*\* | 0.027 | 0.006 |
| C | 0.63524\*\*\* | 0.198 | 0.005 |
|  | | | |
| R-squared | 0.720 | | |
| Adjusted R-squared | 0.539 | | |
| F-statistic | 3.982 | | |
| Prob(F-statistic) | 0.005 | | |
| Durbin-Watson stat | 1.934 | | |

*Source: Author’s Computation, 2017.*

*Note: \*, \*\* and \*\*\* represents significance level of 10%, 5% and 1% respectively.*

**4.1.8 Testing of Hypotheses**

**Hypothesis I** (Ho1): FDI in the telecom sector has no significant effects on contribution of Telecom to GDP in Nigeria.

**Decision Rule**: If P>0.05 accept null hypothesis otherwise reject.

The result in table 4.1.7 reveals that the coefficient (0.15988; P= 0.043) shows a positive and significant relationship between one period lag of FDItel and current GDPtel, F-statistic 7.011, Adjusted R-square value 0.720 and Durbin Watson 2.189 respectively. Hence, the study rejects the null hypothesis and concludes that FDItel has significant effects on contribution of Telecom to economic growth.

**Hypothesis II (**Ho2): There is no significant difference between FDI in the telecom sector before and within GSM in Nigeria.

**Decision Rule**: If the absolute value of computed t-statistics is less than table value (1.96) at 5% level and n-1 degree of freedom accept the null hypothesis otherwise reject.

The |t| = 2. 690 of the t-test result in table 4.1.6 shows that there is significant difference between FDItel in before and within GSM era at 5% level of significance. Thus, the study rejects the null hypothesis that there is no significant difference between FDI in the telecom sector in the before and within GSM in Nigeria.

**Hypothesis III** (Ho3): There is no significant relationship between contributions of the telecom sector to economic growth.

**Decision Rule**: If P>0.05 accept null hypothesis otherwise reject

The result in table 4.1.7.1 shows that the coefficient of GDPtel (0.0327; P= 0.071) is positive and insignificantly related to RGDP (economic growth). The result accepts the null hypothesis and concluded that there is no significant relationship between contributions of telecom sector to economic growth.

**4.2 Discussion of Research Findings**

Results from various analysis carried out revealed that FDI inflow to the telecommunications sector has significant effect on the sector. This can be depicted from the “Trend of Foreign Direct Investment in Telecommunications Sector” where the result showed that telecommunications sector increases from N39.10 million in 1985 to N47, 527.50 million in 2015. This implied that with the advent of FDI in the telecommunications sector, their performance took a good shape.

In addition, while considering the trend of contribution of telecommunications sector to GDP, findings revealed that Gross Domestic Product (GDP) rises from N18, 452.43 million in 1985 to N5, 933, 089.01 billion in 2015, which may be due to full deregulation of the sector in 2001.

The study also test for the presence of unit root in variables formulated in achieving this study objectives and findings revealed that at various levels of significance (1%, 5%), the variables were found to be non – stationary (i.e. there is presence of unit root) at level. However, it became stationary after first difference. The study progressed to test the log-term relationship and it was discovered that the variables co-integrate at 5% level. Since the variables cointegrated, there is a long run relationship among the variables. The result from the ECM revealed that there is a short term relationship among the variables in question, and (-0.258) implied that there will be speed of convergence of variables from their long-run co-integrating equilibrium.

Furthermore, the study tests for impact of FDI on Tele-communications sector, pre and within GSM era. The result revealed that the introduction of GSM significantly affects Nigeria’s Foreign Direct Investment inflow in telecommunications sector. The average value of the two periods stood at N361.17m and N18, 900.70m before and within the introduction of GSM with Standard deviation of N239.21m and N26,833.76m respectively.

The finding has helped to achieve the objective that there is positive relationship between economic growth and foreign direct investment. The result in table 4.1.7.1 showed no significant effect with 0.00464. This agrees with the previous study of Solomon and Eka (2013) and negates the previous study of Izuchukwu (2014) which showed negative relationship between Foreign Direct Investment in Communications and Gross Domestic Product.

Finally, the researcher is of the opinion that introduction of Foreign Direct Investment in telecommunications sector revealed positive result (0.14687) and statistically insignificant at 5%.

**CHAPTER FIVE**

**SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

**5.1 Summary**

This study investigated the Effects of Foreign Direct Investment in Telecommunications sector on Economic Growth in Nigeria during period 1985-2015. The Augumented Dickey-Fuller (ADF) and Phillips-Perron (PP) was used to test whether the variables are stationary or non-stationary in levels, first or second differencing and to inspect the presence of unit root in the variables involved. The test was based on annual time series data for eight (8) variables.

The study then proceeded to find out whether there existed any long run relationships among the variables using the Johansen co-integration test. The result revealed that there exist three (3) co-integrating vectors at 5% level of significance also maximum Eigen value test, implying that there is a long relationship among variables. Thereafter, paired T-test was used to analyze the difference between Foreign Direct Investment in Telecommunications in Nigeria before and within GSM era, the result showed |t| = 2. 690 that indicate the sector experienced a tremendous change within GSM era when compared with before GSM era.

To test for the hypotheses, the study utilized the popular unit root test method; based on the relationship between economic growth and FDI, there is no significant effect of FDI on economic growth, the result showed 0.00464 with less than 1% level of significance. Also, the study finds that there is a positive and statistically significant relationship between Gross Domestic Product in telecommunications sector (GDPtel) and Foreign Direct Investment inflow to the telecommunications sector (FDItel).

**5.2 Conclusion**

The development in ICT, especially GSM has motivated attention of researchers to critically examine the contribution of the telecom sector on economic growth in Nigeria like other countries of the world. Many researchers are of the view that the FDI in telecommunications will mostly contribute to the growth of the economy.

This study attempts to address the question; whether the FDI in telecommunications has significantly contributed to the growth of the Nigerian economy. Using empirical methods, this study tested the effects of FDI in telecommunications sector and economic growth.

It made use of extensive data covering 1985-2015. Empirical results indicated that there is positive relationship between economic growth (GDP) and Foreign Direct Investment. The result was positive but insignificant contrary to some findings. The insignificant relationship could be as a result of insufficient FDI fund invested into Nigerian economy which has not been able to significantly impact on the economic.

Based on the findings there has been a great improvement in the contribution of FDI in telecommunications to the economic growth within GSM period when compared with before GSM when the sector could not fully achieved her statutory function in Nigeria. The study, therefore, concludes that there is insignificant and positive relationship between FDI in telecommunications and the economic growth.

**5.3 Recommendations**

Based on the findings of this study, it was discovered that FDI inflow contributes to the telecommunications sector and thus the entire economy as depicted by GDP. However, variables like “exchange rate” and “inflation rate” impedes growth. The study recommends that:

1. Government should be at her best to ensure that the environment is made conducive for investors. Also, the issue of currency fluctuation should be properly addressed to avoid losing most of these Multinational Companies who has contributed a large quota to the economy growth. By doing this, the increase trend of FDI inflow will be sustained.
2. Government should provide an enabling environment for the investors in order to sustain the trend of inflow of FDI into the economy.
3. Government should take advantage of advancement in technology which the telecom sector brought about by injection of FDI into the economy within the GSM period.
4. The telecommunications sector should see to it that there is more improvement on their services in this GSM era. Citizens should be more sensitized on the use of mobile phones, viz-a-viz internet, in order to be technologically inclined.
5. There should be stable economic policies directly or indirectly that will attract foreign investors.

**5.5 Contribution to Knowledge**

Currently, from existing literature, there is lack of consensus among scholars both in theory and empirical evidence on the nature of the relationship among FDI, telecommunications performance and economic growth in Nigeria. While majority of the studies focused on the interactions and directions of causality between FDI inflow and GDP growth rate (output performance), others examined wholly the nexus between telecommunications sector performance and economic growth. Again, while many proponents of theories on FDI maintain that it is rather a curse than blessing to developing countries (Nigeria inclusive) other sees FDI as the only external source of development finance for these countries.

With full acknowledgement of some of these contributors however, the value addition of this study lies on its empirical departure from the existing works in the following ways: Firstly, it focuses on the transmission mechanism of FDI to economic growth (GDP) through the telecommunications sector. It does this by modeling the interactive effects or cumulative effects that FDI’s inflow to the telecom sector have had on the growth rate of GDP in Nigeria for the period of 1985-2015. Secondly, the result of the study provides a database for further research on FDI effect on telecom. Thirdly, this study, unlike any existing study (to the best of the researcher’s knowledge) used a dummy variable modeling approach to separate the effects of FDI on the telecommunications sector, and by extension on economic growth in Nigeria pre and post the liberalization of the telecommunications sector in Nigeria that brought about massive access and use of GSM and other mobile telecommunications devices.

Evidently, the point of departure of this study and the observed lacuna (gap) filled by this study is that none of the existing studies separates impact analysis into pre and post GSM era in Nigeria for the period of 1985-2015. Therefore, the findings of this study will be beneficial to different stakeholders.

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APPENDIX I-RAW DATA FOR THE ANALYSIS

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Foreign Direct Investment in Telecommunications Sector (N’m) | Contribution of the Telecommunications Sector to the Gross Domestic Product of Nigeria (N’m) | Real GDP\_ (N' M) | Exchange Rate (N:$) | Inflation Rate | Gross Fixed Capital Formation (N' M) | Openess | Credit to Private Sector (N'M) | GSM\_Dummy |
| 1985 | 39.10 | 18452.43 | 14953913.05 | 0.89 | 1.03 | 8799.48 | 0.09 | 13070.34 | 0 |
| 1986 | 80.40 | 18329.74 | 15237987.29 | 2.02 | 13.67 | 11351.46 | 0.07 | 15247.45 | 0 |
| 1987 | 75.60 | 18513.77 | 15263929.11 | 4.02 | 9.69 | 15228.58 | 0.24 | 21082.99 | 0 |
| 1988 | 160.60 | 18697.81 | 16215370.93 | 4.54 | 61.21 | 17562.21 | 0.24 | 27326.42 | 0 |
| 1989 | 158.20 | 19070.78 | 17294675.94 | 7.39 | 44.67 | 26825.51 | 0.38 | 30403.22 | 0 |
| 1990 | 240.50 | 19451.12 | 19305633.16 | 8.04 | 3.61 | 40121.31 | 0.58 | 33547.70 | 0 |
| 1991 | 373.20 | 19841.27 | 19199060.32 | 9.91 | 22.96 | 45190.23 | 0.80 | 41352.46 | 0 |
| 1992 | 391.50 | 20535.69 | 19620190.34 | 17.30 | 48.80 | 70809.16 | 1.29 | 58122.95 | 0 |
| 1993 | 426.40 | 21254.64 | 19927993.25 | 22.05 | 61.26 | 96915.51 | 1.40 | 127117.71 | 0 |
| 1994 | 429.60 | 21468.12 | 19979123.44 | 21.90 | 76.76 | 105575.49 | 1.34 | 143424.21 | 0 |
| 1995 | 374.80 | 22540.42 | 20353202.25 | 81.00 | 51.59 | 141920.24 | 6.06 | 180004.76 | 0 |
| 1996 | 485.60 | 23666.71 | 21177920.91 | 81.30 | 14.31 | 204047.61 | 6.37 | 238596.56 | 0 |
| 1997 | 672.60 | 25084.99 | 21789097.84 | 81.60 | 10.21 | 242899.79 | 6.91 | 316207.08 | 0 |
| 1998 | 689.20 | 26338.88 | 22332866.90 | 83.80 | 11.91 | 242256.26 | 5.11 | 351956.19 | 0 |
| 1999 | 820.30 | 27708.09 | 22449409.72 | 92.69 | 0.22 | 231661.69 | 6.57 | 431168.36 | 0 |
| 2000 | 820.30 | 29398.74 | 23688280.33 | 102.11 | 14.53 | 331056.73 | 8.90 | 530373.30 | 0 |
| 2001 | 955.30 | 339917.31 | 25267542.02 | 111.94 | 16.49 | 372135.65 | 9.04 | 764961.52 | 1 |
| 2002 | 1736.30 | 422730.57 | 28957710.24 | 120.97 | 12.14 | 499681.53 | 7.52 | 930493.93 | 1 |
| 2003 | 2890.50 | 536439.55 | 31709447.39 | 129.36 | 23.84 | 865876.46 | 10.82 | 1096535.57 | 1 |
| 2004 | 4281.10 | 852513.97 | 35020549.08 | 133.50 | 10.01 | 863072.62 | 12.49 | 1421664.03 | 1 |
| 2005 | 5565.40 | 1112658.88 | 37474949.16 | 132.15 | 11.57 | 804400.82 | 17.88 | 1838389.93 | 1 |
| 2006 | 8291.00 | 1497577.11 | 39995504.55 | 128.65 | 8.57 | 1546525.65 | 17.51 | 2290617.76 | 1 |
| 2007 | 10758.20 | 2016072.65 | 42922407.93 | 125.83 | 6.56 | 1936958.21 | 19.27 | 3668657.82 | 1 |
| 2008 | 7996.80 | 2715045.02 | 46012515.31 | 118.57 | 15.05 | 2053005.95 | 23.77 | 6920498.75 | 1 |
| 2009 | 13238.10 | 3657881.20 | 49856099.08 | 148.90 | 13.93 | 3050575.92 | 19.59 | 9110859.11 | 1 |
| 2010 | 72073.30 | 4931991.14 | 54612264.18 | 150.30 | 11.82 | 4012918.65 | 25.99 | 10157021.18 | 1 |
| 2011 | 7564.40 | 4992420.11 | 57511041.77 | 153.86 | 10.28 | 3908280.32 | 31.45 | 10660071.84 | 1 |
| 2012 | 6519.60 | 5176559.39 | 59929893.04 | 157.50 | 11.98 | 3357397.77 | 28.02 | 14649276.46 | 1 |
| 2013 | 85606.60 | 5420654.36 | 63218721.73 | 157.31 | 7.96 | 3728138.88 | 26.00 | 15751837.52 | 1 |
| 2014 | 8506.40 | 5677875.45 | 67152785.84 | 158.55 | 7.98 | 4228697.18 | 16.49 | 17129683.85 | 1 |
| 2015 | 47527.50 | 5933089.01 | 69023929.94 | 196.99 | 9.55 | 4254488.23 | 10.48 | 18674147.78 | 1 |

|  |  |
| --- | --- |
| **VARIABLE NAME** | **SOURCE** |
| Foreign Direct Investment in Telecommunications Sector (N’M) | Central Bank of Nigeria (CBN) Annual Report, 2015 |
| Contribution of the Telecommunications Sector to the Gross Domestic Product of Nigeria (N’M) | National Bureau of Statistics (NBS), 2015 |
| Real GDP\_ (N' M) | National Bureau of Statistics (NBS), 2015 |
| Exchange Rate (N:$) | Central Bank of Nigeria (CBN) Statistical Bulletin, 2015 |
| Inflation Rate | Central Bank of Nigeria (CBN) Statistical Bulletin, 2015 |
| Gross Fixed Capital Formation (N' M) | Central Bank of Nigeria (CBN) Statistical Bulletin, 2015 |
| Credit to Private Sector (N'M) | Central Bank of Nigeria (CBN) Statistical Bulletin, 2015 |

APPENDIX II

Descriptive Result

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | RGDP | GDPTEL | FDITEL | GCF | CRF | EXCHR | INFL | OPEN | GSMDUM |
| Mean | 32821097 | 1472057. | 9346.723 | 1203690. | 3794314. | 88.54644 | 20.13518 | 10.40891 | 0.483871 |
| Median | 23688280 | 29398.74 | 820.3000 | 331056.7 | 530373.3 | 102.1052 | 11.98000 | 7.518113 | 0.000000 |
| Maximum | 69023930 | 5933089. | 85606.60 | 4254488. | 18674148 | 196.9900 | 76.75887 | 31.45384 | 1.000000 |
| Minimum | 14953913 | 18329.74 | 39.10000 | 8799.480 | 13070.34 | 0.893750 | 0.223606 | 0.072361 | 0.000000 |
| Std. Dev. | 17311753 | 2123730. | 20602.99 | 1529538. | 5870433. | 61.07289 | 19.75929 | 9.638805 | 0.508001 |
| Skewness | 0.818071 | 1.134291 | 2.839882 | 1.033965 | 1.431885 | -0.234094 | 1.553723 | 0.658419 | 0.064550 |
| Kurtosis | 2.261511 | 2.602709 | 9.852781 | 2.423848 | 3.561803 | 1.671599 | 4.191320 | 2.221976 | 1.004167 |
|  |  |  |  |  |  |  |  |  |  |
| Jarque-Bera | 4.162168 | 6.851388 | 102.3263 | 5.952368 | 11.00086 | 2.562469 | 14.30580 | 3.021702 | 5.166689 |
| Probability | 0.124795 | 0.032527 | 0.000000 | 0.050987 | 0.004085 | 0.277694 | 0.000783 | 0.220722 | 0.075521 |
|  |  |  |  |  |  |  |  |  |  |
| Sum | 1.02E+09 | 45633779 | 289748.4 | 37314375 | 1.18E+08 | 2744.940 | 624.1907 | 322.6762 | 15.00000 |
| Sum Sq. Dev. | 8.99E+15 | 1.35E+14 | 1.27E+10 | 7.02E+13 | 1.03E+15 | 111896.9 | 11712.89 | 2787.197 | 7.741935 |
|  |  |  |  |  |  |  |  |  |  |
| Observations | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |