

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI,
GHANA**

KNUST

The Effect of Foreign Direct Investment (FDI) On Infrastructure Development In Ghana

by

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in partial fulfilment of the requirements for a degree of

MASTER OF PHILOSOPHY

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DECLARATION

I hereby declare that this submission is my own work towards the MSc. programme in Management and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where duly acknowledgment has been made in the text.

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ABSTRACT

In light of the glut of studies on the direction of causality between Foreign Direct Investment (FDI) and Infrastructure development, empirical evidence is not clear for country groups. This study therefore sought to explore the correlation between FDI, infrastructure development and Growth in Ghana using time series data from 1990 and 2015. The specific objectives included to; examine the pattern of FDI inflows in Ghana over the last two decades; examine the antecedents of FDI inflows into Ghana; examine the causal relationship between FDI and GDP Growth; explore the relationship between FDI and infrastructure development in Ghana. The data were obtained from the World Bank - African Development Indicators Database, the Ministry of Finance and Economic Planning - Fiscal Data. Other sections were complemented with data from R and C A publications. Standard time series unit root test was conducted using Generalized Likelihood Squares Differencing (DF-GLS) to check the stationarity of variables. The main models were considered Model 1 - Antecedents to FDI; Model 2 - Growth Model; Model 3 - Infrastructure Model. With respect to the pattern of FDI inflows into the country, the study found a general increase in the inflows of foreign investment over the same period; however it is shown that between 1994 to 2002 share falls in the FDI inflows were rampant. It however assumed its steady rise onwards to 2014. For the growth model, the study found that average growth rate for the 25-year period was 0.99% far less than the annual change in GDP growth of 1.66% for the data span. The long run **Fully Modified Least Square (FMOLS)** estimation showed that *inflation, GDP growth rate, exchange rate fluctuations, political risks and reversals* of FDI inflows have a strong impact on current FDI inflows at 5% significant level. In the Two (2) estimations adopted to capture the effects of FDI on growth, FDI was shown not to draw any significant impact on growth in both models. The strength of both models is validated by the adjusted R-squares of 70.5% in the first model and 71.9% in the second

model. To achieve growth in infrastructure, it is recommended that Government works at ensuring FDI is attracted to sectors of the economy that directly trickle into growth. It is also important that the country's trade policies are geared towards opening the country's market for more trade. However, a careful analysis should be done to identify sectors that warrant subsidies so as not to suffocate nascent industries.

Keywords: Ghana, Foreign Direct Investment, Growth, Infrastructure, Regression.



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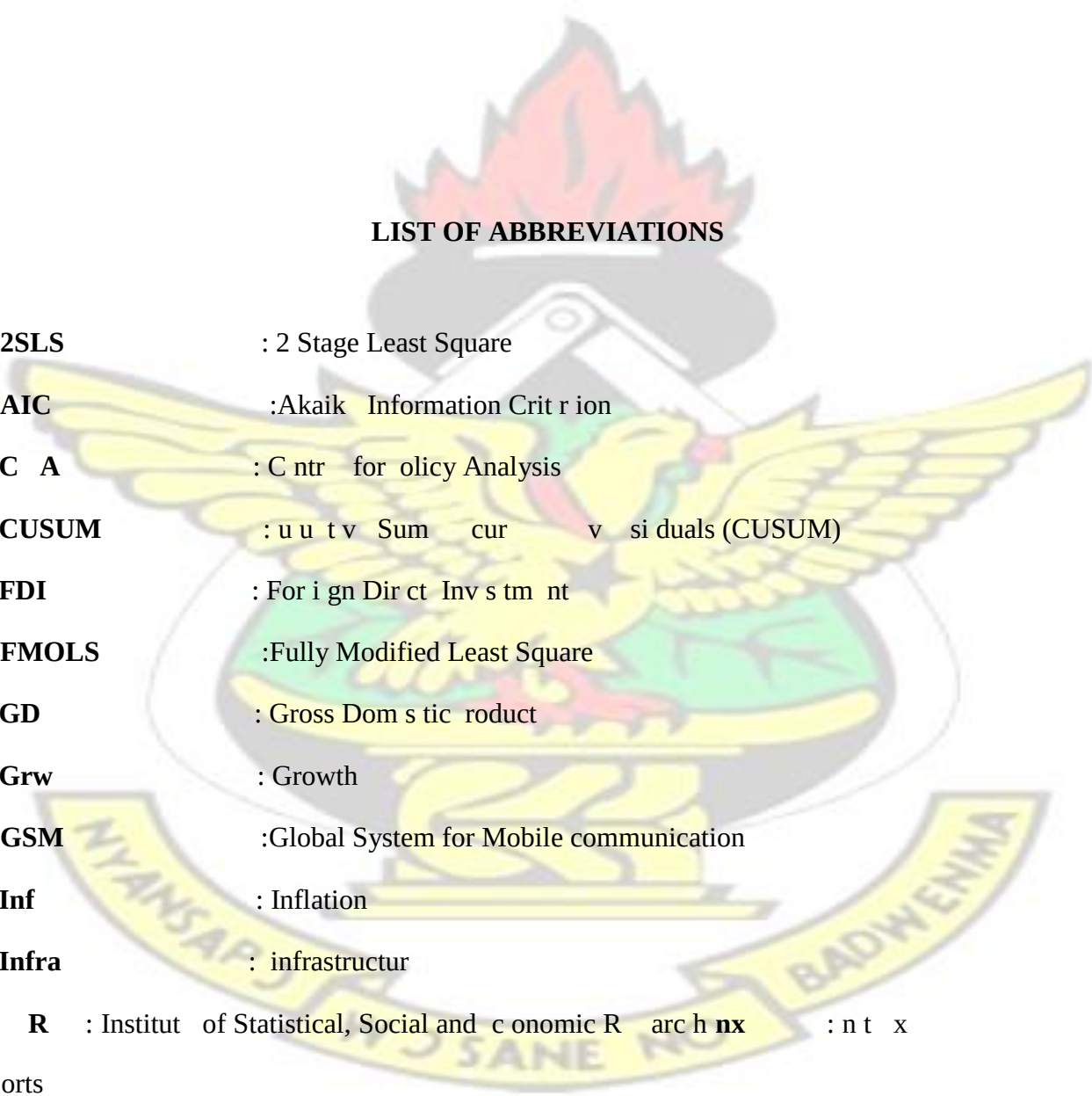
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D DICATION

I d d icat this c of acad m ic work r t t t Almighty Allah and to my ar nt s Mr. and Mrs. d for t i r l v and su ort and also to my su r visor Dr. D - Graft OwusuManu for his guidanc during t r aration of this docum nt, t hank you Dr.

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LIST OF ABBREVIATIONS

The logo of Kenya Methodist University (KNUST) is a large, faint watermark in the background. It features a central shield with a yellow eagle with outstretched wings, a red flame above it, and a green base. The shield is flanked by two yellow banners with the text 'NYANSAPU' and 'BADWENMA'. Below the shield is a yellow banner with the text 'SANE NO'.

2SLS	: 2 Stage Least Square
AIC	: Akaike Information Criterion
C/A	: Control Policy Analysis
CUSUM	: Cumulative Sum of residuals (CUSUM)
FDI	: Foreign Direct Investment
FMOLS	: Fully Modified Least Square
GD	: Gross Domestic Product
Grw	: Growth
GSM	: Global System for Mobile communication
Inf	: Inflation
Infra	: Infrastructure
IR	: Institute of Statistical, Social and Economic Research
Imports	: Importation

SBC : Schwarz-Bayesian Criterion

UNCTAD : United Nations Conference on Trade and Development

WIR : World Investment Report



CHAPTER ON

INTRODUCTION

1.1 Background of the Study

The world's economy has experienced a tremendous increase in trade and investment both in developed and developing countries (Kaur et al., 2013; Karny, 2007; Herz et al., 2006). This trend is more pervasive in developing countries with substantial market and abundant labour force, making them an attractive foreign investment destination. It is reported that developing and transition economies received more than half (53%) of the global FDI flows (UNCTAD, 2011). Indeed, Trade and FDI inflows have been widely recognised as very important factors in the economic growth process. Past empirical studies, both cross country and country specific, on FDI interaction on growth and infrastructure development (Balasubramanyam et al., 1996; Borusztin et al., 1998; Koai-boon, 2004; Mansouri, 2005; Karbasi et al., 2005; Li et al., 2000; and Ahlavan et al., 2005) have mostly concluded that FDI inflows promote economic growth and infrastructure development. Nevertheless, there are clear indications that the growth enhancing effects from FDI inflows vary from country to country.

For some countries FDI can negatively affect the growth process (Balasubramanyam et al., 1996; Borusztin et al., 1998; D'Mello, 1999; Li et al., 2000; and Xu, 2000). According to Bhagwati's well-known proposition (called Bhagwati's hypothesis) "with due adjustments for differences among countries for their economic size, political attitudes towards FDI and stability, both the magnitude of FDI flows and their efficacy in promoting economic growth would be greater over the long run. Thus, the growth enhancing effect of FDI is not automatic but depends on various country specific factors such as the trade openness. Similar conclusion is made by Asidu (2002)

and other studies that an efficient environment that comes with more openness to trade is likely to attract more FDI inflows for faster growth. Empirical studies on the importance of inward FDI in host countries also suggest that the foreign capital inflow augments the supply of funds for investment thus promoting capital formation in the host country (Kandioro and Chitiga, 2003). Again, inward FDI can stimulate local investment by increasing domestic investment through links in the production chain when foreign firms buy locally made inputs or when foreign firms supply source intermediated inputs to local firms (Tsikata *et al.*, 2000). FDIs can also increase the host country's export capacity causing the developing country to increase its foreign exchange earnings. It is also associated with new job opportunities and enhancement of technology transfer, and boosts overall economic growth in host countries (Mllow, 1999; Herz *et al.*, 2006; Chowdhury and Mavrotas, 2005). A number of firm-level studies, on the other hand, however, do not lend support for the view that FDI necessarily promotes infrastructure development.

1.2 Problem Statement

Despite the plethora of studies on the direction of causality between FDI and Infrastructure development (Mllow, 1999; Kholdy, 1995; Herz *et al.*, 2006; Chowdhury and Mavrotas, 2005), the empirical evidence is not clear for country groups. Following the criticisms in recent studies (Karny, 2007; Kaur *et al.*, 2013) of the traditional assumption of a one-way causal link from FDI to Infrastructure development, new studies have also considered the possibility of a bidirectional or non-existent causality between FDI and Infrastructure development. From the numerous existing studies, the causal link between FDI and Infrastructure development as an empirical question seems to be dependent upon the set of conditions in the specific host country economy (Kaur *et al.* 2013;

Herz et al. 2008; Mansouri, 2005; Chowdhury, and Mavrotas, 2005). An interestingly, empirical debates about the causal nature of the relationship between FDI and infrastructure development are still subjects of concern to macro economists because empirical literatures on different economies also have conflicting results.

In assessing Ghana's infrastructure development from a continental perspective, the World Bank report indicates that infrastructure contributed just over one percentage point to Ghana's annual real GDP growth during the 2000s raising the country's infrastructure endowment to that of the region's middle-income annual growth rate of more than 2.7 percentage points (World Bank, 2011). According to the report, Ghana has an advanced infrastructure platform when compared with other low-income countries in Africa (World Bank, 2011). The country's coverage levels for rural water, electricity, and GSM signals are impressive. A large share of the road network is in good or fair condition. Institutional reforms have been adopted in the ICT, ports, roads, and water supply sectors (Vivian and Nataliya, 2011). Ghana's most pressing challenges lie in the power sector, where outmoded transmission and distribution assets, rapid demand growth, and periodic hydrological shocks leave the country reliant on high-cost oil-based generation. Exceptionally high losses in water distribution leave little to reach end customers, who are thus exposed to intermittent supplies. Addressing Ghana's infrastructure challenges will require raising annual expenditures to \$2.3 billion (World Bank, 2011). The country already spends about \$1.2 billion per year on infrastructure, equivalent to about 7.5 percent of GDP. A further \$1.1 billion is lost each year to inefficiencies, notably underpricing of power. Ghana's annual infrastructure funding gap is about \$0.4 billion per year, chiefly related to power and water (World Bank, 2011). This study therefore seeks to examine the correlation between FDI and infrastructure development using a set of conditions in Ghana's economy

cont xt .

1.3 Aims and Obj ct iv

This s ct ion s k s to addr ss th r s arc h aim and obj ct iv s of th study.

1.3.1 R s arc h Aim

This study s t s out to x lor th corr lat ion b tw n FD I and infrastru ctur d v l o m nt in Ghana using tim s r i s data from 1990 and 2015.

1.3.2 R s arc h Obj ct iv s

In ord r to achi v th abov aim, th study is s c ifically d s ign d t o;

1. x lor th tr nd of FDI flow, GD Growth , infrastru ctur d v l o m nt in Ghana
2. x lor factors and conditions that influ nc FDI inflows into Ghana
3. xam in th causal r lat ionshi b tw n FD I and GD Growth
4. x lor th r lat ionshi b tw n FDI and infrastru ctur d v l o m nt in Ghana

1.4 R s arc h Qu s tions

Th following qu s tions hav b n d v l o d bas d on th r s arc h ga s id nt ifi d to fulfill th aim and obj ct iv s of th study.

1. What has b n t h att rn of FDI inflows in Ghana, ov r t h ast two d cad s ?
2. What conditions aff ct t h d rivation of FDI inflows in Ghana?
3. To what xt nt d o s FDI aff ct GD growth in Ghana?

4. Is there any significant relationship between FDI and infrastructure development in Ghana?

1.5 Significance of the study

There are several reasons why the relationship between FDI and infrastructure development must be studied. First, Foreign Direct Investment is an important determinant of the growth process of Ghana. Hence, a literature that would empirically examine the FDI-Infrastructure link is important because increased FDI inflows into the economy should fuel infrastructure growth. The direction of causality between FDI and infrastructure development will be crucial for the formulation of policies that will either encourage foreign investors or deter them.

Additional factor that makes this study worth undertaking is that most of the studies on FDI focus on the linkages between FDI, Inflation and growth based on cross country studies. However, the conclusion from such studies may be less relevant at a country level. In addition, aggregated cross-country studies constrain the coefficients of variables. Questions therefore arise about the homogeneity of the sample of the countries in terms of economic performance, structural characteristics and political stability and other things. Finally, this study will close the obvious research gap that already exists in the literature. It would also serve as a point of departure for further research in addition to providing information to future researchers who may be interested in studying the inflation-FDI-infrastructure nexus in Ghana.

1.6 Scope of the study

This study examines the trend of FDI inflows into the country (Ghana) over the last 2 decades; the underlying objective is to identify strategic influences that determine the decision to locate or invest in a particular country or economy. Some previous studies (Asidu, 2002; Chowdhury, and Mavrotas, 2005; D'Mello, 1999) used road network, investment in telecommunications network, electricity coverage as proxy for infrastructure; for the purpose of this study, telecom infrastructure and water coverage would be used as proxy for infrastructure. This is because investments in these two sectors have significant impact on industry and the citizenry. The data used in the empirical analysis would be mainly secondary data collected from the period, 1990 to 2015 consisting of yearly observations for each variable. The real GDP growth and foreign direct investment net inflows as a percentage of GDP (FDI ratio) data would be taken from the World Bank's *World Development Indicators 2011*. In addition, data will also be collected from the Ghana Investment Promotion Centre (GIPC) as Ghana is the focal point of this study. Annual time series data covering the period 1990-2015 for which data are available would be used. The choice of these variables is as a result of the interrelationships and interdependence.

1.7 Overview of Methodology

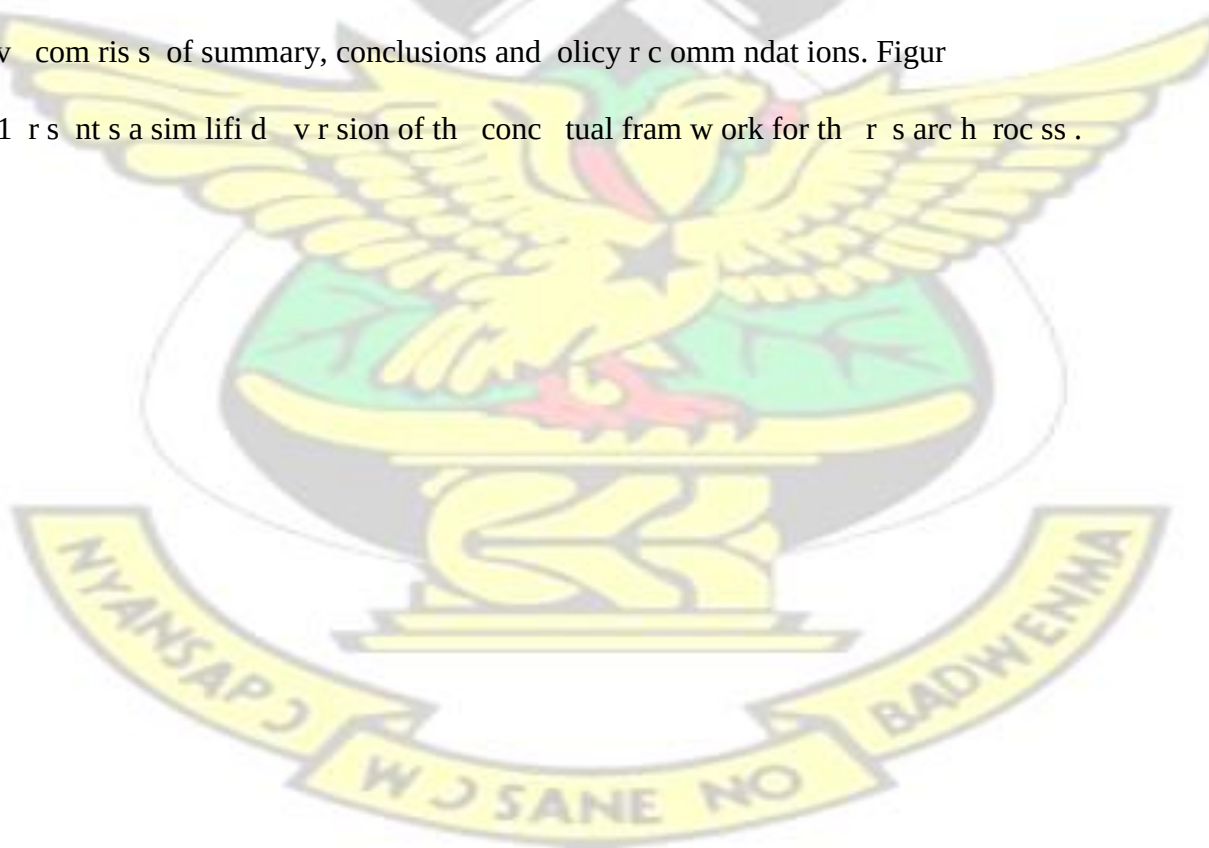
The study combined both explanatory and descriptive research designs; the research adopted the functionalist paradigm because of its objective and regulatory dimensions. As explained by Burrill and Morgan (1979, 26) the functionalist paradigm is problem-oriented in a search and seeks to provide practical solutions to a given situation. The main source of data is secondary. As FDI figures would be taken from World Bank records. In analyzing the data the following tests would be

employed: Unit root test for stationarity, Augmented Dickey-Fuller Test (ADF), Ordinary Least Squares (OLS) method, Cointegration test, Vector error correction model (VCEM), etc. These are here will also rely on statistical computing software (stata) to implement the time series methods and all statistical tests would be carried out at 0.05 level of significance.

1.8 Organization of the Study

The study is organized into five chapters. The first chapter is the introduction which covers the background to the study, problem statement, research aim and objectives, hypothesis, justification of the study and organization of the study. Chapter two presents summary of the existing theoretical and empirical literature on FDI and infrastructure development. Chapter three deals with the methodology for the study; Chapter four focuses on model estimation and data analysis. Chapter five comprises of summary, conclusions and policy recommendations. Figure

1.1 presents a simplified version of the conceptual framework for the research process.



Chapter one		General introduction: Background of study, Problems statement, Aim, Objective, Justification, Scope, Methodology and Organisation of study
Chapter two		Literature Review: Theoretical and empirical literature on FDI and infrastructure development
Chapter Three		Research methodology: Research Philosophy, Population, Sample, source of data, research instrument and analytical tools
Chapter Four		Model Estimation: model estimation and data analysis.
Chapter five		Conclusion and Recommendation: Summary of findings, policy implication and areas for further research

Figure 1.1: Conceptual framework of Research Organisation

Source : Researcher's Construct (2015).

LITERATURE REVIEW

2.1 Introduction

This chapter presents relevant theoretical and empirical literature on the linkages between foreign direct investment and infrastructure development in Ghana. The first section explores global FDI flows and driving factors; the second section examines empirical literature of FDI flows whilst the last section draws conclusions from both the theoretical and empirical literature.

2.2 Global picture of Foreign Direct Investment

Growth in FDI accelerated in the 1990s, rising to \$331 billion in 1995 and \$1.3 trillion in 2000 (UNCTAD, 2002). As a result, developing countries experienced a sharp increase in the average ratio of FDI to total investment during the 1990s. A principal feature of the growth in FDI has been its rise in the services sector, which is now the dominant sector in global FDI. For developing countries, FDI in services increased at an annual rate of 28% over the period 1988 to 1999, and by 1999, accounted for 37% of total foreign investment inflows. A significant part of the increase in FDI in the services sector has been the growth in private capital flows for infrastructure investments to the general trend towards privatization of infrastructure in developing countries (WIR, 2012). In contrast, there was a sharp decline in donor support for infrastructure projects during the 1990s, with aggregate flows of official development assistance for the infrastructure industries falling by half during the course of the decade (Willoughby, 2002). Private sector participation in infrastructure projects in developing countries has risen dramatically since 1990 and the annual investment commitments reached a peak of \$128 billion in 1997. According to the World Bank's Private Participation in Infrastructure (PI) database, 26 countries awarded 72 infrastructure projects with

private participation in 1984-89, attracting almost \$19 billion in investment commitments. In the 1990s, 132 low- and middle-income countries pursued private participation in infrastructure – 57 of them in three or all four of the sectors covered in the database (transport, energy, telecommunications, and water and sewerage). In 1990-2001, developing countries transferred to the private sector the operational responsibility for almost 2,500 infrastructure projects, attracting investment commitments of more than \$750 billion (WIR, 2002).

Studies show that Global FDI inflows have not been consistent (Chowdhury, and Mavrotas, 2005; Asidu, 2002; Saba, and Flac'h, 2005). In 2012 for instance, foreign direct investment (FDI) inflows is reported to have decreased in all three major economic groups – developed, developing and transition economies, although at different paces (WIR, 2012). In developed countries, FDI flows fell by 32 percent to \$561 billion, a level last seen almost ten years ago. The records also show that majority of European Union (EU) countries and the United States experienced significant drops in their FDI inflows (WIR, 2012). Interestingly, FDI inflows to developing economies remained relatively resilient, declining by only 4 percent, accounting for 52 percent of global inflows in 2012. Flows to areas such as developing Asia and Latin America and the Caribbean lost some momentum, although they remained at historically high levels. All sub-regions in developing Asia – East and South-East Asia, South Asia and West Asia – saw their flows decline in 2012, compared with the previous year (World Bank, 2012). FDI inflows to the structurally weak, vulnerable and small economies rose further in 2012 from a small base of \$56 billion in 2011 to \$60 billion, owing to the strong growth of FDI to least developed countries (LDCs) and small island developing States (SIDS). Their share in the world total also rose, to 4.4 percent from 3.4 percent in 2011 (World Bank, 2012). Outward FDI from developed economies declined by \$274 billion in 2012, accounting for almost all of the fall in global outward FDI; in

contrast to the sharp decline of FDI flows from developing countries, FDI flows from developing economies rose by 1 percent in 2012, amounting to \$426 billion. As a result, their share in global outflows reached a record 31 percent. FDI outflows from Africa almost tripled; flows from Asia and Latin America and the Caribbean remained almost at the 2011 level (World Bank, 2012).

Africa is one of the few regions to enjoy year-on-year growth in FDI inflows since 2010. Investment in exploration and exploitation of natural resources, and high flows from China both contributed to the current level of inward flows (WIR, 2012). Moreover, by the continent's good economic performance – GDP growth at an estimated 5 percent in 2012 – underpinned the rise in investment, including manufacturing and services. In contrast, FDI flows to West Africa declined by 5 percent, to \$16.8 billion, to a large extent because of declining flows to Nigeria. Weighed down by political instability and the weak global economy, that country saw FDI inflows fall from \$8.9 billion in 2011 to \$7.0 billion in 2012 (World Bank, 2012). Meanwhile, Liberia and Mauritania both experienced a surge in inward FDI flows. In Mauritania, FDI inflows doubled to \$1.2 billion, which can be attributed in part to the expansion in mining operations (copper and gold) by Canadian-based First Quantum Minerals and Kinross. Central Africa attracted \$10 billion of FDI in 2012, a surge of 23 percent on the previous year. Slowing FDI inflows to the Congo were offset by an increase to the Democratic Republic of the Congo, where inward FDI flows jumped from \$1.7 billion to \$3.3 billion. Some of the flows went towards the expansion of the copper-cobalt Tnk Fungurum mine. Recent natural resource discoveries also contributed to the increase in FDI inflows to East Africa, from \$4.6 billion in 2011 to \$6.3 billion in 2012. This includes investment in recently discovered gas reserves in the

United Republic of Tanzania and oil fields in Uganda (WIR, 12). Outward FDI flows from Africa nearly tripled in 2012, from \$5 billion in the previous year to an estimated \$14 billion. South

African companies were active in acquiring operations in mining, wholly owned from the country to \$4.4 billion in 2012. The growth in investment from South Africa, coupled with year-on-year increase in FDI outflows from Angola, resulted in a significant expansion of overseas investment activities from the Southern Africa region. Central Africa, North Africa and West Africa also recorded significant rise in their outflows in 2012, boosted primarily by increase from the Democratic Republic of the Congo, Liberia, Libya and Nigeria (WIR, 2012).

2.2.1 Foreign Direct Investment inflow in Ghana since 1990 – 2015

One of the economic problems of developing countries is that, they do not have enough national savings to finance their investments. They are in constant need of foreign capital in forms of both direct and indirect investments. Initially, they took loans from international commercial banks. But in the 1980s, the drying-up of commercial bank lending, because of debt crises, forced many countries to reform their investment policies so as to attract more stable forms of foreign capital, and FDI appeared to be one of the easiest way to get foreign capital without undertaking any risks linked to the debt (WIR, 2012). Thus, it became an attractive alternative to bank loans as a source of capital inflows. Agiomirgianakis *et al.* (2003) mentioned that FDI is mostly direct foreign capital flows resulting from the behaviour of multinational companies (MNCs). Thus, the factors to affect the behaviour of MNCs may also affect the magnitude and the direction of FDI. MNCs expand their activities to a foreign country for a number of reasons including, among others, the exploitation of economies of scale / scope, the use of specific advantages, often owing to a life-cycle attrition of their products or just because their competitors are engaged in similar activities.

On the other hand, governments are also engaged in a policy competition by changing key factors of their economic policies, such as domestic labour market conditions, corporate taxes, tariff barriers

reforms, subsidies, privatization and regulatory reforms so as to improve FDI activity in these countries.

Foreign direct investment (FDI) inflows to low-income countries has not only received much publicity in the last two decades due to its economic importance, but its overall flow to these countries has also significantly increased in both relative and absolute terms. However, only a few sub-Saharan African countries have been successful in attracting significant FDI inflows. Globally, Africa's share of FDI to world FDI inflows rose from 1 percent in 2000 to 2 percent in 2001 (UNCTAD, 2002), a greater share going to resource-rich countries such as Algeria, Angola, Egypt, South Africa, and Nigeria (Kandoro and Chitiga, 2003). The historical trend of FDI inflows in Ghana can be shown in three main phases since 1983 (Tsikata *et al.*, 2000). The period 1983-88 witnessed sluggish inflows, averaging about \$4 million per annum, and the highest and lowest inflows during this period being \$6 million in 1985 and \$2 million in 1984 respectively. The period 1989-1992 recorded moderate inflows averaging about \$18 million per annum with the highest and lowest being \$22 million in 1992 and \$14.8 million in 1990 respectively. The 1993-1996 was a period of significant, but oscillatory inflows, which peaked in 1994 at \$233 million, but fell by more than 50% the following year to \$107 million. The latest value for Foreign direct investment, net (Bo, current US\$) in Ghana was (\$3,226,300,000.00) as of 2013. Over the last 8 years, the value for this indicator has fluctuated between (\$144,970,000.00) in 2005 and (\$3,293,430,000.00) in 2012.

Table 2.1: FDI Inflow in Ghana

Year	Value	Year	Value
1975	\$70,869,950.00	1994	\$233,000,000.00

1976	(\$18,260,970.00)	1995	\$106,500,000.00
1977	\$19,217,480.00	1996	\$120,000,000.00
1978	\$9,696,237.00	1997	\$81,800,000.00
1979	(\$2,800,000.00)	1998	\$167,400,000.00
1980	\$15,600,000.00	1999	\$243,700,000.00
1981	\$16,263,750.00	2000	\$165,900,000.00
1982	\$16,300,000.00	2001	\$89,320,000.00
1983	\$2,400,000.00	2002	\$58,930,000.00
1984	\$2,000,000.00	2003	\$136,751,000.00
1985	\$5,600,000.00	2004	\$139,270,000.00
1986	\$4,300,000.00	2005	\$144,970,000.00
1987	\$4,700,000.00	2006	\$636,010,000.00
1988	\$5,000,000.00	2007	\$1,383,178,000.00
1989	\$15,000,000.00	2008	\$2,714,916,000.00
1990	\$14,800,000.00	2009	\$2,372,540,000.00
1991	\$20,000,000.00	2010	\$2,527,350,000.00
1992	\$22,500,000.00	2011	\$3,222,240,000.00
Y ar	Valu	Y ar	Valu
1993	\$125,000,000.00	2012	\$3,294,520,000.00

1994	\$233,000,000.00	2013	\$3,227,000,000.00
1995	\$106,500,000.00		

Source : World Bank Data base (2013)

An equally important feature of the FDI inflows according to Tsikata et al (2000) is the three way nexus of economic growth, investment and political stability, which has emerged since the coup d'état of 1972. In 1972, a growth rate of 2.3% was recorded, accompanied by a more than 60% drop in FDI (from \$30.6 million in 1971 to \$11.5 million in 1972). Similar trends were experienced after 1979 and 1981 coup d'état when growth fell to as low as -3.2%; there was also an outflow of \$2.8 million of FDI. The state of the economy worsened further with a negative growth rate of -3.5% in 1981 to -6.9% in 1982; however inflow of FDI remained constant at \$16.3 million. The relationship emerged again when parliamentary democracy was restored in 1992. The rate of growth of 5.3% in 1991 fell to 3.9% in 1992; this has been previously attributed to deficit financing undertaken to finance the democratic process. The FDI flow however, increased from \$20 million in 1991 to \$22.5 million in 1992 excluding investment in the mining sector.

2.3 Determinants of Foreign Direct Investment

There are many theories which attempt to explain the determinants of FDI. These theories are significant steps towards the development of a systematic framework for the management of FDI.

Howver, the capacity of each to serve as a self-contained general theory which could explain all types of FDI (i.e., outward as well as inward FDI at the firm, industry, and country level) has been questioned in the works of various scholars. Agarwal (1980), Arya (1985), Itaki (1991) can be given as examples. Dunning is one of the most references by authors working on FDI. Dunning (1993) describes the main types of FDI based on the motivational behind the investment from the perspective of the investing firm. The first type of FDI is called *market-seeking* FDI, whose aim is to serve local and regional markets. It is also called horizontal FDI, as it involves replication of production facilities in the host country. Tariff-jumping or export-substituting FDI is a variant of this type of FDI. This is because the reason for horizontal FDI is to better serve a local market by local production, market size and market growth of the host economy play important roles. Obstacles to accessing local markets, such as tariffs and transport costs, also encourage this type of FDI. The second type of FDI is called *resource-seeking*: when firms invest abroad to obtain resources not available in the home country, such as natural resources, raw materials, or low-cost labour (Dunning, 1993). Particularly in the manufacturing sector, when multinationals directly invest in order to export, factor-cost considerations become important. In contrast to horizontal FDI, vertical or export-oriented FDI involves relocating parts of the production chain to the host country. Availability of low-cost labour is a prime driver for export-oriented FDI. Naturally, FDI in the resource sector, such as oil and natural gas, is attracted to countries with plentiful natural endowments (World Bank, 2012). The third type of FDI, called *efficiency-seeking*, takes place when the firm can gain from the common governmental or geographically dispersed activities in the presence of economies of scale and scope (WIR, 2012).

In 1998, the World Investment Report, UNCTAD (1998) has analysed the determinants of FDI and host country determinants have been classified into three groups. These are political factors,

business facilitation and economic factors. The absence of a generally accepted theoretical framework has led researchers to rely on empirical evidence for explaining the magnitude of FDI (ADB, 2004).

2.3.1 Market Size

Artig and Nicolini (2005) state that market size is measured by GDP or GDP *per capita* is more to both the most robust FDI determinant in economic studies. This is the main determinant for horizontal FDI. It is irrelevant for vertical FDI. Jordaan (2004) mentions that FDI will move to countries with large and expanding markets and greater purchasing power, where firms can potentially receive a higher return on their capital and by implication receive higher profit from their investments. Chakrabarti (2001) states that the market-size hypothesis supports an idea that a large market is required for efficient utilization of resources and exploitation of economies of scale: as the market-size grows to some critical value, FDI will start to increase thereafter with its further expansion. This hypothesis has been quite popular and a variable representing the size of the host country market has come out as an explanatory variable in nearly all empirical studies on the determinants of FDI (Bouoiyour, 2003). In ODI (1997), it is stated that economic studies comparing a cross section of countries point to a well-established correlation between FDI and the size of the market, which is a proxy for the size of GDP, as well as some of its characteristics, such as average income levels and growth rates. Some studies found GDP growth rate to be a significant explanatory variable, whereas GDP was not, probably indicating that where the current size of national income is very small, increases may have less relevance to FDI decisions than growth performance, as an indicator of market potential. Economic results on market size are far from being unanimous. Edwards (1990) and Jasrson *et al.* (2000) use the inverse of income *per capita* as a proxy for the

turn on capital and conclude that real GDP *per capita* is inversely related to FDI/GD, but Schneider and Fry (1985), Tsai (1994) and Asidu (2002) find a positive relationship between the two variables. They argue that a high real GDP *per capita* implies better prospects for FDI in the host country. Areltun (2008) finds that the variable GD is positive and statistically significant at less than 1% level. She argues that the enlargement of market size tends to stimulate the attraction of FDI to the economy. Ang (2008) finds that real GDP has a significant positive impact on FDI inflows. He also finds that growth rate of GDP exerts a small positive impact on inward FDI.

2.3.2 Openness

Chakrabarti (2001) states that there is mixed evidence concerning the significance of openness, which is measured mostly by the ratio of exports plus imports to GDP, in determining FDI, as well. The maintained hypothesis is: given that most investment projects are directed towards the tradable sector, a country's degree of openness to international trade should be a relevant factor in the decision. Jordaan (2004) claims that the impact of openness on FDI depends on the type of investment. When investments are market-seeking, trade restrictions (and therefore less openness) can have a positive impact on FDI. The reason stems from the "tariff jumping" hypothesis, which argues that for foreign firms that seek to serve local markets may decide to set up subsidiaries in the host country if it is difficult to import their products to the country. In contrast, multinational firms engaged in export-oriented investments may prefer to invest in a more open economy since increased importations that accompany trade liberalization generally imply higher transaction costs associated with exporting. Whalley and Mody (1992) observe a strong positive support for the hypothesis in the manufacturing sector, but a weak negative link in the electronics sector. Kravis and Lisy (1982), Culm (1988), Edwards (1990) find a strong positive effect of openness on FDI and Schmitz and Bri (1972) obtain a weak positive link. Areltun (2008) finds that *trade openness* is positive but

statistically significant from zero. In ODI (1997), it is stated that while access to specific markets – judged by their size and growth – is important, domestic market factors are predictably much less relevant in export-oriented foreign firms. A range of surveys suggests a widespread reaction that “open” economies encourage more foreign investment.

2.3.3 Labour Costs and productivity

Charkrabarti (2001) claims that wages as an indicator of labour cost has been the most contentious of all the potential determinants of FDI. Theoretically, the importance of cheap labour in attracting multinationals is agreed upon by the proponents of the dependency hypothesis as well as those of the modernization hypothesis, though with very different implications. There is, however, no unanimity even among the comparatively small number of studies that have explored the role of wages in affecting FDI: results range from high real wage host country wages discouraging inbound FDI to having no significant effect or even a positive association. There is no unanimity in the studies regarding the role of wages in attracting FDI. Goldsborough (1979), Saunders (1982), Flamm (1984), Schneider and Fry (1985), Culm (1988), and Shamsuddin (1994) demonstrate that high real wages discourage FDI. Tsai (1994) obtains strong support for the cheap-labour hypothesis over the period 1983 to 1986, but weak support from 1975 to 1978. In ODI (1997), it is stated that empirical research has also found relatively low labour costs to be statistically significant, particularly for foreign investment in labour-intensive industries and for export-oriented subsidiaries. However, when the cost of labour is relatively insignificant (when wages vary little from country to country), the skills of the labour force are expected to have an impact on decisions about FDI location.

2.3.4 Political Risk

The ranking of political risk among FDI determinants remains rather unclear. According to ODI (1997), where the host country owns rich natural resources, no further investment may be required, as it is seen in politically unstable countries, such as Nigeria and Angola, where high returns in the extractive industries seem to compensate for political instability. In general, as long as the foreign company is confident of being able to operate profitably without excessive risk to its capital and personnel, it will continue to invest. For example, large mining companies overcome some of the political risks by investing in their own infrastructure maintenance and their own security forces (Jasranta *et al.*, 2000). Moreover, these companies are limited neither by small local markets nor by exchange-rate risks since they tend to sell almost exclusively on the international market at hard currency prices. Specific proxy variables (e.g. number of strikes and riots, work days lost, *etc.*) have proved significant in some studies; but these quantitative estimates can capture only some aspects of the qualitative nature of political risk.

Empirical relationships between political instability and FDI flows is unclear. For example, Jasranta *et al.* (2000) and Hausmann and Frenandez-Arias (2000) find no relationship between FDI flows and political risk while Schnيدر and Frey (1985) find an inverse relationship between the two variables. Using data on U.S. FDI for two time periods, Lora and Guisinger (1995) found that political risk had a negative impact on FDI in 1982 but no effect in 1977. Edwards (1990) uses two indicators, namely political instability and political violence, to measure political risk. Political instability (which measures the probability of a change of government) was found to be significant, while political violence (i.e. the frequency of political assassinations, violent riots and politically motivated strikes) was found to be insignificant.

2.3.5 Infrastructure

Infrastructure covers many dimensions ranging from roads, ports, railways and telecommunication systems to institutional development (e.g. accounting, legal services, etc.). According to ODI (1997), poor infrastructure can be seen, however, as both an obstacle and an opportunity for foreign investment. For the majority of low-income countries, it is often cited as one of the major constraints. But for investors also point to the potential for attracting significant FDI if host governments permit more substantial foreign participation in the infrastructure sector. Jordaan (2004) claims that good quality and well-developed infrastructure increases the productivity potential of investments in a country and therefore stimulates FDI flows towards the country. According to Asidu (2002) and Ancharaz (2003), the number of telephones per 1,000 inhabitants is a standard measurement in the literature for infrastructure development. However, according to Asidu (2002), this measurement falls short, because it only captures the availability and not the reliability of the infrastructure. Furthermore, it only includes fixed-line infrastructure and not cellular (mobile) telephones.

2.3.6 Growth

The role of growth in attracting FDI has also been the subject of controversy; Chakrabarti (2001) states that the growth hypothesis is developed by Linn (1983) maintained that a rapidly growing economy provides relatively better opportunities for making profits than those growing slowly or not growing at all. Lunn (1980), Schneider and Fry (1985) and Culm (1988) find a significantly positive effect of growth on FDI, while Tsai (1994) obtains a strong support for the hypothesis over the period 1983 to 1986, but only a weak link from 1975 to 1978. On the other hand, Nigh (1985) reports a weak positive correlation for the less developed economies and a weak

negative correlation for the developed countries. Ancharaz (2003) finds a positive effect with lagged growth for the full sample and for the non-Sub-Saharan African countries, but an insignificant effect for the Sub-Saharan Africa sample. Gaetanaga *et al.* (1998) and Schneider and Fry (1985) found positive significant effects of growth on FDI.

2.3.7 Tax

The literature remains fairly inconclusive regarding whether FDI may be sensitive to tax incentives.

Some studies have shown that host country corporate taxes have a significant negative effect on FDI flows. Others have reported that taxes do not have a significant effect on FDI. Hartman (1994), Grubert and Muth (1991), Hines and Ric (1994), Lora and Guisinger (1995), Cassou (1997) and Kmsly (1998) find that host country corporate income taxes have a significant negative effect on attracting FDI flows. However, Root and Ahmed (1979), Lim (1983), Wheller and Mody (1992), Jackson and Markowski (1995), Yulin and Rod (1995) and Morcano and Ric (1996) conclude that taxes do not have a significant effect on FDI. Swenson (1994) reports a positive correlation. The direction of the effects of above mentioned determinants on FDI may be different. A variable may affect FDI both positively and negatively. For example, factors, such as labour costs, trade barriers, trade balance, exchange rate and tax have been found to have both negative and positive effects on FDI. In the empirical studies various combination of these determinants as explanatory variables have been used. Moosa (2005) states that due to the absence of a consensus on a theoretical framework to guide empirical work on FDI, there is no widely accepted set of explanatory variables that can be regarded as the “true” determinants of FDI.

2.4 International Investment Theories

The early works of FDI theory can be traced in the work by MacDougall (1958) who established his model based on the assumptions of perfectly competitive markets. His theory was further elaborated by Krugman (1964). Assuming a two-country model and a rise in capital being equal to its marginal productivity, MacDougall and Krugman both stated that when there was free movement of capital from an investing country to a host country, the marginal productivity of capital tended to be equalized between the two countries. They found that for investment, the output of the investing country fell without any decrease in the national income of the country. This is because in the long term the investing country gets higher income from its investment abroad.

2.4.1 Industrial organization approach

Hymn was one of the pioneers who established a systematic approach towards the study of FDI. In his 1960 doctoral dissertation, Hymn (1976) developed the FDI theory approach of industrial organization. His theory, which was one of the first works to explain international production in an imperfect market framework, was supported by Limfalu (1961), Kindleberger (1969), Knickerbocker (1973), Cavus (1974), Dunning (1974), Vaitos (1974) and Cohen (1975) among others. The essence of Hymn's theory is that firms operating abroad have to compete with domestic firms that are in an advantageous position in terms of culture, language, legal system and consumer's preference. Furthermore, foreign firms are also exposed to foreign exchange risk. These disadvantages must be offset by some form of market power in order to make international investment profitable.

2.4.2 FDI based on monopolistic power

Kindleberger (1969), by extending the work of Hymer, put forward his theory of FDI on the basis of monopolistic power. Kindleberger argued that advantages enjoyed by MNCs could be useful only in the case of market imperfection. The advantages described by him might be in the form of superior technology, managerial expertise, patents etc. These advantages generally encourage a firm to invest in a foreign country in order to fully exploit the immediate advantage of sharing them with potential competitors in the foreign market. The greater the chances of earning monopoly profits, the higher will be the encouragement among firms to invest directly. Although, Kindleberger described various forms of advantages generally enjoyed by a firm over the host country firm, he failed to describe which advantage a firm should focus on. Further, a firm can exploit its monopolistic advantages abroad only if the host country's policy allows it to do so. Generally, in the name of national interests, the host Government would be unwilling to permit entry of foreign firms into the country.

2.4.3 Internalization theory of FDI

Buckley and Casson (1976) provided another explanation of FDI by putting emphasis on international trade in inputs and technology. They shifted the focus of the international investment theory from country-specific towards industry-level and firm-level determinants of FDI (Henisz, 2003). Buckley and Casson analysed MNCs within a broad-based framework developed by Coase (1937). Their theory came to be known as internalization theory as they stressed this fact with regard to the creation of MNCs. They articulated their theory based on the postulates:

- (a) Firms maximize profits in a market that is imperfect;

(b) When mark t s in int r m d iat r oducts ar i m r f ct, t h r i s an inc nt iv t o by ass th m by cr at ing int rnal mark t s.

(c) Int rnal i zation of mark t s across th w o r l d l a d s to MNCs.

2.4.4 Oligo olistic th o ry x laining FDI

Knickerbocker (1973) also formulated his theory based on market imperfections. It has been asserted in the economic literature that there are two important motives for choosing a particular country as a location for setting up a new facility: (a) firms seek increased access to the host country's market; and (b) firms want to utilize the relatively abundant factors available in that country. Knickerbocker also cited a third motivation for choosing a location – firms might invest in a country to match a rival's move (Haggard and Root, 2002). In other words, firms often exhibit imitative behaviour, i.e., they follow the internationalization of competitors so that they will not lose their strategic advantage. In particular, Knickerbocker argued that in oligopolistic market conditions, firms in an industry tend to follow each other's location decision. The idea is that firms, uncertain of production costs in the country to which they are currently exporting, run the risk of being undercut by a rival switching from exporting to setting up a manufacturing subsidiary in the host country. By imitating the rival's FDI, the firm can avoid being underpriced (Altomonte and Annings, 2003).

2.4.5 eclectic paradigm to FDI

In the 1970s one of the most robust and comprehensive theories of FDI was developed by Dunning (Rugby, 2007). In his breakthrough work, Dunning (1977 and 1979) amalgamated the major market-based theories discussed above – the oligopolistic and internalization theories – and added a third dimension in the form of location theory to explain why a firm opens a foreign

subsidiary. Location theory addresses the important questions of who produces what goods or services in which locations, and why? Location theory has also been frequently applied by researchers in attempting to understand the factors that influence locations of MNC units. Among others, they enumerated factors such as host country policies, economic fundamentals, firm strategy and agglomeration economies.

Furthermore, endogenous growth theory explains that economic growth is mainly generated by factors like economies of scale, increasing returns or induced technological changes which are within the production process. Romer (1990) and Grossman and Helpman (1991) developed growth models within the endogenous growth theory to explain the relationship between FDI and growth. These models assume that technological progress is the principal driving force of economic growth. The theories focus on the creation of technological knowledge and its transfer, and view innovation as major engines for growth. Therefore, these models lack emphasis on human capital accumulation and externalities on growth. In this regard growth rate of developing economies is seen to be reliant on the extent to which these countries can attract and utilize innovative technologies available in highly developed economies. They argue that FDI is the main channel for the process of advanced technologies by developing countries (Sabra, and Flach, 2005). Developing countries generally are not able to innovate and generate new technologies. Therefore, they have to adopt technology that is produced from advanced countries through the channel of FDI.

The new growth theories indicate bidirectional causality between FDI and growth (Blomstrom et al., 1996; Bornsztein et al., 1998). This is because FDI is expected to lend a hand in improving economic growth by encouraging the incorporation of new inputs and foreign technologies in the production function of the beneficiary country. In addition, FDI enhances growth by adding to the

host country, existing knowledge base through human resource training and development. Also FDI increases competition in the host country by overcoming entry barriers and reducing the market power of existing firms (Dunning 1993; Blomstrom et al., 1996; Borjas et al., 1998 and D'Mello, 1999). Nevertheless, Dowling and Himelz (1982) and Lall and Rana (1986) contend that rapid economic growth also induces the FDI inflows. This is explained by the reason that high sustainable growth usually creates high levels of capital requirements in the recipient economy and as a result, the host country needs more FDI by creating the necessary macro economic climate to attract foreign investors. The steady growth in the host nation also builds the self-assurance of foreign investors investing in the host country. Thus, both FDI and economic growth are positively and lead to bidirectional causality.

2.5 Empirical Review on Foreign Direct Investment and Growth

Balasubramanyam et al. (1996) used cross-country data averaged over the period 1970-1985 for a sample of 46 developing countries and found that trade openness is crucial for acquiring the potential growth impact of FDI. Moreover, their estimates indicated that FDI has stronger effects on growth than domestic investment, which may be viewed as a confirmation of the hypothesis that FDI acts as a vehicle for international technology transfer. Borjas et al. (1998) tested the correlation between FDI and GDP in a cross-country regression framework with 69 developing countries over two subperiods 1970-1979 and 1980-1989. They discovered that the effect of FDI on growth depends on the level of human capital in the host country and that FDI has positive growth effects only if the level of education is higher than a given threshold. Thus, the findings of Borjas et al. support the results of Borjas et al. that FDI positively affects growth. However, both studies failed to check for directional causality between the two variables. Zhang (2000) empirically examined cointegration and causality between FDI and growth for 11 developing

ing countries in Asia and Latin America over the period 1970-1995. The findings indicate a positive relationship between FDI and growth and a Granger causality from FDI to GDP for five countries. In addition, Bond et al. (2001) also studied the relationship between FDI and growth in four developing countries using annual time series data over the period 1970-1998. The results showed a positive and significant relationship between FDI and growth. Thus both studies agree that FDI relates positively with growth and that FDI stimulates growth in developing countries. Cho (2003) used annual data to investigate how FDI and economic growth relate in eighty countries over the period 1971-1995. The results confirmed the validity of Granger causality relationship between FDI and economic growth in the short run. Basu et al. (2003) agreed with Cho when they applied both co-integration and causality tests to study the causality between FDI and growth using a panel of 23 developing countries over the period 1978-1996. They found a positive relationship between FDI and GDP. Their results indicated bidirectional causality between the two variables for economies. Chowdhury and Mavrotas (2003) empirically looked at the linkage between FDI and GDP growth using annual time series data covering the period 1969 to 2000 for the developing countries. They employed the Johansen and Granger causality tests and established a positive connection between FDI and GDP growth and causality that runs from both directions. Thus, the empirical findings of Chowdhury and Mavrotas support the results obtained by Basu et al. (2003).

The results by Ramírez (2000) indicated that for the period 1960-1995, FDI Granger-causes growth in Mexico. The study also established a positive relationship between FDI and growth in both the short and the long run relationships. In addition, Athukorala (2003) examined the relationship between FDI and growth using time series data from the Sri-Lankan economy. The econometric results showed a positive and significant relationship between FDI and economic growth. The study also

establish a unidirectional causality from growth to FDI. As seen from the two studies, the different results could be due to the difference in estimation techniques. While Ramírez used the Johansen cointegration approach, Athukorala employed the Bounds Test to cointegration. The difference in sample sizes could also contribute to the variation in the findings of the two studies. Dritsaki, et al. (2004) investigated the relationship between trade, FDI and economic growth for Greece over the period 1960-2002. The cointegration analysis revealed that there is a long-run equilibrium relationship. They also used the Granger causality test and the results showed that there is a bi-directional causal relationship between the variables. Similarly, a study regarding the relationship between FDI and economic growth for Cyprus over the period 1976-2002 was examined by Frideun (2004) using the Granger causality and strong evidence emerged that economic growth as measured by GDP in Cyprus is Granger caused by the FDI, but not vice versa. The findings of Frideun conflict with that of Dritsaki, et al. possibly because the latter added trade as a control variable in their study. Alfaro et al. (2004) examined the links among FDI, financial markets and economic growth using cross-country data from 71 developing countries averaged over the period 1975-1995. Their empirical evidence suggests that FDI plays an important role in contributing to economic growth but the level of development of local financial markets is crucial for the positive effects to be realized. In addition, Carkovic and Levine (2005) also studied how FDI relates with growth using annual data averaged over seven 5-year periods between 1960 and 1995 for a sample of 68 developing countries. Using econometric specifications that allow FDI to influence growth differently depending on national income, trade openness, education and domestic financial development, they found that FDI exerts a robust and positive impact on economic growth. Thus Carkovic and Levine agree with Alfaro et al., that FDI and growth are positively related and that FDI enhances growth in developing countries. Hansen and Rand (2005) analyzed the causal relationship

relationship between FDI and GDP in a sample of 31 developing countries. Using estimators for heterogenous panel data, they found a unidirectional causality between FDI to GDP ratio implying that FDI causes growth. In addition, Johnson (2006) modeled the potential of FDI inflows to affect host country economic growth. This analysis was performed with panel data for 90 countries during the period 1980 to 2002. The study discovered that FDI inflows enhance economic growth. Therefore, the findings of Johnson harmonize with Hansen and Randt that FDI and growth are positively related and that FDI sustains growth. Herz et al. (2008) also revisited the FDI-led growth hypothesis for 28 developing countries. They used cointegration and error correction model and discovered that there is no causality between FDI and economic growth. Abdus Samad (2009) continued with Herz et al. when he analyzed the relationship between foreign direct investment and economic growth for 19 developing countries of South-east Asia and Latin America. The study employed the cointegration technique, Granger causality test and Error Correction Model to analyze the variables. The results confirmed a unidirectional causality that runs from economic growth to foreign direct investment for five countries in Latin America and one country in east and South-east Asia. In addition, the author reported a two-way causal relationship between foreign direct investment and economic growth for seven countries (two from Latin America and five from east and South-east Asia). Lastly, a unidirectional short run causal link that runs from economic growth to foreign direct investment was found in four countries (one from Latin America and three from east and South-east Asia).

Anwar and Mohammad (2011) looked at how foreign direct investment and economic growth interact in Bangladesh, Pakistan and India over the period of 1972 to 2008. They used the Johansen approach to cointegration and the Granger causality test. The findings indicated that there is no cointegration relationship between FDI and economic growth in Bangladesh and India but there is

a positive co-integration relationship between FDI and growth in Pakistan. On the other hand the causality test showed that there is no directional causality between GDP and FDI for Bangladesh. Quisr et al. (2011) investigated the impact of foreign direct investment on Growth of South Asian Association for Regional Cooperation countries. This relationship was tested by applying multiple regression models. The change in GDP is taken as dependent variable while FDI and inflation are considered as independent variables. The data used for this is ranging from year 2001 to 2010. The results showed that the overall model is significant. There is a positive and significant relationship between GDP and FDI. The findings of Quisr et al conflict with that of Anowar and Mohammad because of difference in methodology, data and sample size. Furthermore, Looss et al. (2010) examined the linkage and directional causality between FDI and growth of ten Sub-Saharan African countries using annual time series data from 1970 to 2007. They employed the Johansen et al. (2001) approach to co-integration and the Toda and Yamamoto (1995) causality test and realized a positive and significant long run relationship between FDI and GDP growth in Angola, Liberia, Kenya and South Africa. However, they found a unidirectional causality running from FDI to GDP growth. Both Looss et al and Ogiagah et al. have the same opinion on the relationship between FDI and growth. However, the difference in directional causality could be due to the difference in methodology. Annual time series and panel data may not yield the same results. Lastly the two econometric techniques - Granger causality and Toda and Yamomanto could also yield the different results.

Sumi-Tang et al. (2008) examined the causal link between foreign direct investment, domestic investment and economic growth in China over the period 1988-2003. The study confirmed a unidirectional causality that runs from foreign direct investment to economic growth. The authors concluded that foreign direct investment has held in capital formation, in addition to accumulation

ing economic growth via complementing domestic investment in China. Thus, the study confirmed the work of Lo and Seng (2009). Similarly, Doumoukou (2009) employed the Johansen cointegration approach to investigate the relationship between foreign direct investment and economic growth in Nigeria using annual time series data covering the period 1970 to 2007. The study established a positive and significant link between foreign direct investment and growth. The Granger causality test also confirmed a bidirectional causality running from foreign direct investment to growth. Ogiagah et al. (2010) as well as the Johansen cointegration approach and the Granger Causality test to consider the linkage between FDI and GDP growth in Nigeria using annual time series data from 1970 to 2007 of the Sub-Saharan Africa Region. The study revealed a positive and significant long run relationship between FDI and GDP growth and a unidirectional causality running from GDP to FDI.

Obiamaka and Onwumeri (2011) ascertained the extent to which growth in foreign direct investments (FDIs) influence economic growth in Nigeria over the period 1980 to 2007 using annual time series data. The study utilized Johansen cointegration technique and discovered a positive long-run relationship between FDI and GDP growth. Saibu et al. (2011) examined the effects of financial development and foreign direct investment on economic growth in Nigeria. Using time series data from 1970 to 2009, the study tested for the time series roots of the variables and adopted the Autoregressive Distributed Lag (ARDL) technique to estimate the model. The results indicated that foreign direct investment had a negative effect on economic growth in Nigeria. The result further shows that foreign direct investment is only significant when combined with stock market indices. The findings of Saibu et al. contradict that of Obiamaka and Onwumeri. This could be attributed to the difference in methodology. The Johansen Cointegration test and the Autoregressive Distributed Lag (ARDL) technique yielded variation in the results. However, both

studies fail to check for causality between FDI and growth in Nigeria. Similarly, Chukwaka et al. (2012) investigated the relationship between foreign direct investment and GDP growth in Nigeria using annual time series data spanning the period 1960 to 2010. They used also the Johansen test and the Granger causality approach and found a positive and statistically significant relationship between foreign direct investment and growth and a bidirectional causality from the variables.

Adjay (2009) examined the relationship between FDI and GDP growth in Ghana using annual time series data covering 1970 to 2007. The Johansen and Juselius (1990) multivariate maximum likelihood procedure was employed. The study established a positive and significant relationship between FDI and growth. The Granger causality tests confirmed a bidirectional causality running from foreign direct investment to growth. Frimong et al., (2011) disagreed with Adjay when they used the Toda and Yamamoto (1995) to explore the causal link between FDI and growth in Ghana using annual time series data from 1970 to 2002. Their results revealed that there is no directional causality between FDI and economic growth for the total sample period and the short-run period. However, they discovered a unidirectional causality from FDI to growth during the short-run period. The conflicting results could be due to the difference in estimation techniques used. Whereas Adjay engaged the Johansen and Juselius (1990) multivariate maximum likelihood procedure, Frimong et al., employed the Toda and Yamamoto (1995) to examine the causal linkage between FDI and growth. In addition, Sackey et al., (2012) employed various econometric tools such as Augmented Dickey-Fuller tests, Vector Autoregression and Johansen cointegration test to study the effect of foreign direct investment on economic growth of Ghana using time series data from 2001 to 2010. They established a positive and significant long-run relationship between FDI and growth and a uni-directional causality running only from FDI to

GD growth in Ghana. Furthermore, Antwi et al. (2013) used annual time series data from Ghana for the period 1980 to 2010. They employed simple ordinary least square regressions and confirmed a positive and statistically significant relationship between FDI and growth. However, the study failed to check for directional causality between the two variables. The literature presents mixed results on the links between inflation, FDI and growth. Most of the empirical studies are based on cross-sectional and panel data. The cross-country and panel data studies normally average the data over the samples used and across countries from different regions. As a result, they may not reveal a true nature of the relationship between Inflation FDI and growth as such studies are not country specific. Secondly, most of the studies also use a bivariate VAR system to study the links between inflation, FDI and growth. They therefore fall short of a systematic analysis of the impact of host country characteristics as they do not explicitly include control variables into the empirical framework. Consequently, such studies may suffer omission and misspecification biases and as such their findings may be misleading.

2.6 Foreign Direct Investment (FDI) and Infrastructure Development

The globalization of the world economy has contributed to a remarkable growth of foreign direct investment (FDI) inflow into developing countries in the 1990s. FDI inflow is now acknowledged as a key factor of economic development especially for developing countries; since it provides the major financial sources to the transfer of technology, organizational and managerial practices and skills, as well as access to international markets (see, e.g., Shatz and Venable, 2000; Alfaro et al., 2004). In particular, multinational enterprises (MNEs) have played an essential role in shaping the patterns of economic development through their FDI decisions (see, e.g., McCann and Mudambi, 2004). Since the 1997 global economic crisis in international financial markets, many developing

ing countries have been strongly advised to rely primarily on FDI inflow for the promotion of economic development on a sustainable basis.

Among various factors as a determinant of FDI inflows, infrastructure development is widely considered as a crucial factor influencing the sustainability of investment location. The examination of the role of infrastructure development is important particularly for developing economies, such as Ghana, since developing infrastructure is one of the main processes to attract domestic and foreign investments. Moreover, discussion at the regional or provincial level is more important for Indonesia due to an on-going process of decentralization (see, e.g., Silv *et al.*, 2001; Fan 2003). Given these arguments, this study aims at verifying the positive relationship between FDI and infrastructure development in Ghana. In addition to the role of infrastructure development, this study also attempts to resort some evidence to explain intra-country determinants of FDI inflows within Ghana. Indeed, an understanding of the determinants of location of FDI inflow could help policy-makers design effective policies to attract FDI inflow into sectors where investment is most needed.

A lot of empirical studies have put more attention on the role of infrastructure development on FDI by using various infrastructure variables covering the quality and the availability of transportations and telecommunications networks. Most of them show the clear evidence supporting that highly developed infrastructure would play a crucial role in attracting FDI inflows at inter- or intra-country level. Concerning the Ghanaian economy, few studies have examined the effect of FDI inflows on infrastructure development. For instance, Frimpong and Otuang-Abayi, (2007) studied the causal link between FDI and GDP growth for Ghana for the pre- and post-SA periods. In other developing economies, Li and Sjöholm (2011) study the relationship between growth and FDI in comparison with other East Asian countries. Moreover, Takii (2005) discusses the role of FDI by

examining productivity spillovers from foreign multinational plants, and Takii (2011) also examines the effect of FDI on economic growth in relation to the origin of investors in Indonesian manufacturing over the period of 1990–2003. Despite the growing importance of FDI inflows in developing economies, empirical evidence is limited on the determinants of location choice of FDI inflows at the regional level.

2.7 Conceptual Framework

This section discusses the conceptual framework that forms the basis for the empirical estimation. The framework shows FDI inflows as a function of relative country characteristics. The World Investment Report, UNCTAD (1998) has analysed the determinants of FDI and host country determinants have been classified into three groups. These are political factors, business facilitation and economic factors. For instance, horizontal multinationals will be dominant if countries are similar in size and relative endowments and transport costs are high. If transport costs are low, a firm might rather export than produce in both countries. If countries are of different sizes, national firms might dominate since it would be relatively costly to have an additional production facility in the small country. Conversely, vertical multinationals should be dominant when countries are different in size and/or relative endowments, with transport costs, legal and political conditions (see figure 2.1 below).

This work however follows Demirhan and Masca (2008) framework with slight modification to explore the antecedents of inward FDI. Literature on FDI and growth also shows a bi-causal relationship. As the main focus of this study, infrastructure is used as dependent variable whilst keeping FDI and its drivers as independent variables.

Independent variables (IV)

Dependent Variables

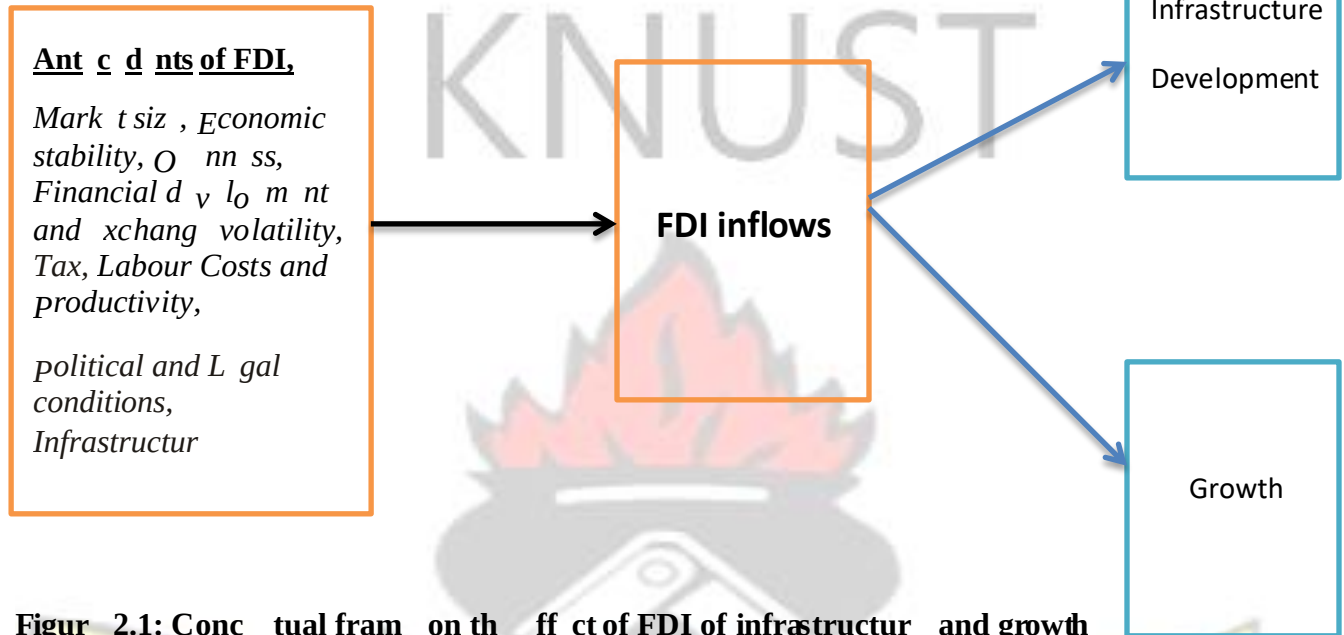


Figure 2.1: Conceptual framework on the effect of FDI on infrastructure and growth

Source: Researcher's Construct, 2016.

CHAPTER

RESEARCH METHODOLOGY

3.1 Introduction

This chapter examines the methods used to arrive at the findings of the study. It covers such areas as the specification of the models used for the study, estimation process and description of the data sources and variables selection.

3.2 Research Designs

Research design refers to the overall strategy chosen to integrate the different components of the study in a coherent and logical manner (Vaus, 2001). The main types of research designs identified by Saunders et al. (2007) include exploratory, descriptive and explanatory studies.

Exploratory research, as the name suggests, intends merely to explore the research questions and does not intend to offer final and conclusive solutions to existing problems. It is conducted in order to determine the nature of the problem, exploratory research is not intended to provide conclusive evidence, but helps to have a better understanding of the problem (Brown, 2006). Saunders et al. (2007, .134) warn that when conducting exploratory research, the researcher ought to be willing to change his/her direction as a result of revelation of new data and new insights. Exploratory research designs do not aim to provide the final and conclusive answers to the research questions, but merely explore the research topic with varying levels of depth. “Exploratory research tends to tackle new problems on which little or no previous research has been done” (Brown, 2006, .43). Moreover, it has to be noted that “exploratory research is the initial research, which forms the basis of more conclusive research. It can vary in determining the research design, sampling methodology and data collection method” (Singh, 2007, .64).

Explanatory research sometimes referred to as analytical studies seek to identify any causal links between the factors or variables that relate to the research problem (Saunders et al., 2007). Such research is also very structured in nature.

Descriptive research on the other hand can be either quantitative or qualitative. It can involve collections of quantitative information that can be tabulated along a continuum in numerical form, such as scores on a test or the number of times a person chooses to use a certain feature of a

multimedia program, or it can describe categories of information such as gender or attributes of interaction when using technology in a group situation (Haks, and Nal, 1994). Descriptive research involves gathering data that describe events and then organizing, tabulating, depicting, and describing the data collection (Glass & Hopkins, 1984). It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution. Because the human mind cannot extract the full import of a large mass of raw data, descriptive statistics are very important in reducing the data to manageable form. When in-depth, narrative descriptions of small numbers of cases are involved, these are hence used as a tool to organize data into attributes that emerge during analysis. Description emerges following exploratory, and serves to organize the findings in order to fit them with explanations, and then test or validate those explanations (Krathwohl, 1993).

This study combines both descriptive and explanatory designs as they allow for both quantitative and qualitative methods. The use of descriptive design yields rich data that leads to a correlative analysis. This method also helps to address questions like “what is the effect of FDI on Growth” whilst explanatory research aids in explaining the causal relationship between FDI, Infrastructure and Growth.

3.3 Data Sources

The study uses annual time series data covering the period 1990-2015. The period for the study was chosen based on the availability of data. The data sets were obtained from the World Bank - African Development Indicators Database, the Ministry of Finance and Economic Planning - Fiscal Data. Data used in the overview section and other sections were supplemented with data from ISSR and CEA publications. All the variables are in constant prices.

3.4 simultaneity procedure

This section represents the simultaneity procedure employed in the exploration of the impact of FDI on growth and infrastructure. The time series data of macro economic variables are used; this section explains the various time series techniques to be used for the analysis. The simultaneity procedure is undertaken with the aid of Stata 12 and view 8 software packages.

A two-stage least squares (2SLS) estimation method was adopted with foreign direct investment was endogenized. The strength of this approach lies in its ability to overcome the simultaneity issues that may arise. Other studies that have also attempted to eliminate the problem of simultaneity by adopting the 2SLS are Mansouri (2005), Omoniyi & Omobitan (2011) and Avh et al., (2013). Thus, in undertaking this study, the 2SLS was preferred.

3.4.1 Unit Root Test

Macro economic variables usually have a time dependent non-stationary) posing problems in the estimation results as the standard assumptions for asymptotic analysis would not be valid. As a result, estimating with ordinary least squares in the presence of non-stationary variables will lead to spurious results. It is critical to test whether a given set of macro economic variables is stationary or not in time series analysis such as this. Economists suggest that use of the standard time series unit root tests namely Augmented Dickey Full test, Phillips-Perron and Dickey-Full test with Generalized Least Squares Differencing (DF-GLS) to check the stationarity of variables. This study uses the DF-GLS test since it is acknowledged as a more robust. The DF-GLS is computed as follows:

$$\Delta X'_t = \beta + \rho t + \delta X'_{t-1} + \sum_{v=1}^p \gamma_v \Delta X'_{t-1} + U_t \text{-----} (3.7)$$

where X'_t is the detrended series and t is the time trend. β, δ and Δ are the constant or drift parameter, an arbitrary parameter and the first-difference operator respectively. γ_v represents the coefficients of the lagged difference terms and U_t is a white noise error term respectively. The DF-GLS regression above tests for the unit root of X_t the logarithm of all the variables at time t . The null and the alternative hypothesis is for the presence of unit root in the variable X_t for the DFGLS tests are:

$$H_0 : \delta = 0 \text{ (stationary)}$$

$$H_1 : \delta < 0 \text{ (non-stationary)}$$

The rejection of the null hypothesis leads to the conclusion that the variable is not stationary. Thus autocorrelation persists which will affect the accuracy of the estimates and therefore wrong inferences can be drawn. The presence of ARCH effect requires the use of lags of the variable to achieve stationarity. To determine the optimal lag length (k) of the model the Akaike Information Criterion (AIC) and Schwarz-Bayesian Criterion (SBC) is widely used. The lag length that results in the lowest AIC or SBC is used as the optimal lag length.

3.4.2 Parameter Stability Tests

There is also the need to test the stability of the parameters to be estimated in the models. This is usually done with the use of the cumulative sum of recursive residuals (CUSUM) plots. It is often applicable when it is necessary to check for systematic changes in the regression coefficients. When the plots cross each other, the null hypothesis is that the regression equation is correctly specified is rejected at 5 percent significance level. Macroeconomic variables have been observed to be influenced by structural changes and different policy regimes. Detecting such an influence in the model will call for the need to cater for this effect in the model specification and the appropriate analytical tool to use.

3.5 Model Specification

Due to the nature of the research questions and objectives; three (3) major models are built for this study to thoroughly investigate the subject matter and draw meaningful conclusions. Under each model, the research attempts to construct the theoretical model upon which a particular econometric function is built to examine the research problem.

3.5.1 Model 1 - Antecedents to FDI

This model explores the determinants of FDI inflows in a developing economy with particular reference to Ghana. Literature indicates that there are a large number of variables that explain FDI inflows. In most of the empirical studies reviewed, it is shown that most of the FDI models specifications in empirical studies are based on the Granger's (1998) classification of the determinants of FDI inflows. Regardless to say, there is a lack of consensus in the empirical literature concerning the critical determinants of FDI inflows. This work however follows

Dominican and Masca (2008) model with slight modification to explore the antecedents of inward FDI. The choice of this model is therefore not based on any distinct theoretical advantages since all models it has been observed emanate from the Granger's (1998) classification of the determinants of FDI inflows; rather, the choice is necessitated on the basis that it reflects the Ghanaian conditions better. Mathematically, model 1 is specified as:

$$Y_t = F(X_t, Z_t) + V_t \text{-----} (3.1)$$

Where Y_t represents the annual inflow of FDI, X is the vector of economic factors; Z comprises the set of legal and political factors. V_t represents the iid error term whilst $t = 1, 2, \dots$ represents the time periods.

The economic variables included in the model are growth rate (gr), real GDP (gd) and population size (p) which are proxies for market size; inflation (inf), manufacturing growth rate (mfg) and change in consumer prices (cpi) – as proxies for economic stability; net exports (nx) – proxy for openness; and M2 as a percentage of GDP (M2g), – proxy for financial development and exchange rate volatility – measured as the standard deviation of the US/GHS exchange rate around its mean – proxy for risk.

The legal and political factors include tax (tx), and political uncertainty (0 = election period, 1 = non election period).

From equation (3.1), a log-linear form of FDI can be specified as:

$$\ln Y_t = \beta + \alpha_i \sum \ln X_{i,t} + \delta_i \sum \ln Z_{i,t} + V_t \quad (3.2)$$

Where α and δ are the output elasticities of economic and legal factors and β is the constant term. The log-linear specification is useful to correct for heteroscedasticity and to achieve uniformity in measurements.

3.5.2 Model 2 – Growth Model

The estimation of model 2 is an attempt to assess the impact of FDI on growth. However, according to literature, FDI and growth have a bi-causal relationship. As a result, this study endogenizes the FDI in the growth model by incorporating model 1. This technique also has the advantage of correcting any persistent autocorrelation that may likely occur due to omission of relevant variables. A similar approach has also been outlined in the works of Asafu-Adjaye, (2005); Omoniye & Omobitan, (2011) and Avh, Krah and Dadzi, (2013).

A Solow production model is specified following the recommendations of Mankiw-Brander et al. (2012) who concluded that the Solow's production function is ideal for explaining and predicting economic growth in Ghana.

$$Y_t = F(K, L, A) \text{-----} (3.3)$$

From the model above, Solow identified total factor productivity (A) as the key determinant of growth in the long term. K represents capital and L for Labour. The general form for Solow's production function used by empirical studies to specify the input-output relationship in developing economies is written as (Omoniyi & Omobitan, 2011):

$$grw_t = \beta_0 + \beta_1 \frac{I}{grw_{t-1}} + \beta_2 L^g + \beta_3 W^g \text{-----} (3.4)$$

Where grw_t = growth rate of GD ; grw_{t-1} = lagged growth rate of GD ; L^g = growth rate of Labour; I = domestic capital formation; W^g = growth rate of other variables influencing total factor productivity; and β_0 = constant assumed to be growth of productivity; whereas $\beta_1, \beta_2, \beta_3$ are parameters to be estimated in the model.

Among the numerous variables observed to influence total factor productivity in developing economies include growth of exports, inflation, FDI and agricultural growth rates (AsafuAdjaye, 2005; Omoniyi & Omobitan, 2011). On the basis of equation 3.4, the following production function is specified for this study:

$$grw_t = \beta_0 + \beta_1 I^g + \beta_2 L^g + \beta_3 FDI + v \text{-----} (3.5)$$

Where growth is a function of labour (L), domestic capital (I), and foreign direct investment (FDI) respectively is formulated and v = error term.

3.5.3 Mod l 3 – Infrastructure Mod l

Mod l 3 consid r s th im act of FDI inflows on infrastructure . Aga in, bas d on for knowl dg in th litatur , FD I is nd og n iz d in th following mod l. Th infrastructure mod l is formulat d as

$$infra_t = \beta_0 + \beta_1 \ln I + \beta_2 \ln L + \beta_3 \ln FDI + \beta_4 \ln H + v \text{ ----- (3.6)}$$

Wh r *infra* is th log of l v l of infrastructure , *I* d n o t s dom s tic ca ital formation; *L* = labour; *H* = human ca ital roxi d by nr ollm nt in t r t iary ducat ion and *v* r s nt s th disturbanc t rm.

CHA T R F OUR

DATA ANALYSIS AND R S ULTS

4.1 Introduction

This cha t r f ocus s on analyzing th data and r s ntat ion of r s ults. It includ s discussions of th findings against r v ious litatur conc rn ing th im act of for i gn dir ct inv s tm nt on growth and infrastructure in Ghana. Th analysis is comm nc d w ith a d s cri tiv summary of th annualiz d data fr om 1991 – 2015 and tr nd analy sis of th k y variabl s – FDI, growth and infrastructure . Th n xt s ct ion was th n t o rf orm th stationarity t s ts using mainly th DGLS roc ss . ft r t s ting th stationary roc ss of th obs r v d variabl s , th y w r th n transform d acc ordingl y and th n t h s timations rf orm d; in th third s ct ion, using all th a ro riat mod l s. Th r s ults ar r s nt d bas d on th study obj ct iv s for ur os s of coh r nc and r adab ility.

4.2 Research Objectives

To benefit the discussion of the effect of FDI on growth and Infrastructure, the study objectives are to find out what the trends and nature of the observed variables have been over the last two decades. This was necessary to offer firsthand information and pictorial depiction of the flow and relationship of the macro economic variables. The purpose is to put the discussion into its proper context so that any further analysis will seek to offer a detailed explanation of the behavior of the variables identified.

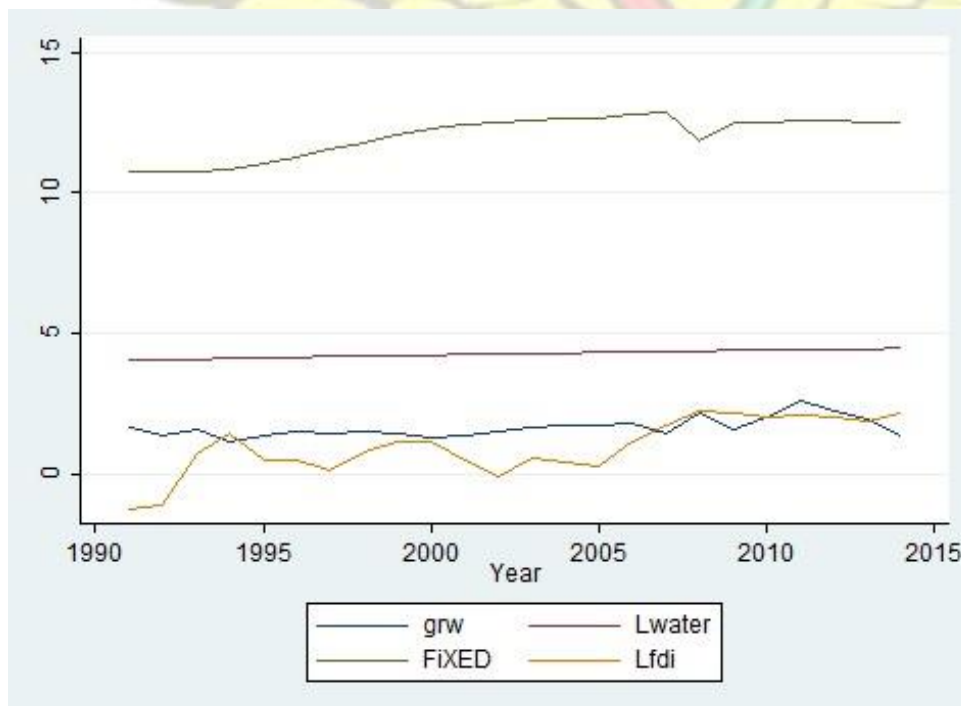
4.2.1 Trends of FDI, Growth and Infrastructure from 1990-2015

There is a general increase in the inflows of foreign investment over the sample period; however, it is shown that between 1994 to 2002 sharp falls in the FDI inflows were seen. It however assumed its steady rise onwards to 2014. The average growth rate for the 25-year period was 0.99% far less than the annual change in GDP growth of 1.66% for the data span. However, figure 4.1 shows evidence of convergence. Standard deviation of both the GDP growth and FDI inflows indicates that for the last 25 years FDI has been more volatile than the GDP growth. This reflects the fact that much variability is observed in the annual FDI inflows unlike in GDP growth. In particular the kernel density plots (see appendix) show less spread out with flat right for the GDP growth rate than the FDI. This shows that Ghana has had long periods of slow growth improvement; meanwhile FDI distribution reveals many years of high FDI inflows. Until 2007-2011, annual change in GDP growth rate has been marginal. The advent of the oil reduction in 2010 saw a peak in GDP growth but soon after underwent a downward spiral. What this study is yet to answer is whether the long periods of significant growth in FDI inflows has had any significant impact on the economy. This trend conforms to the work of Tsikata et al. (2000) which reported that 1993-1996 was a period

period of significant, but oscillatory inflows, which peaked in 1994 at \$233 million, but fell by more than 50% the following year to \$107 million.

It is suggested from figure 4.1 however that some level of convergence is evident; but the latter has little information to suggest causality or no causality at this point.

Returning to infrastructure, proxied by the total number of telephone subscribers (fixed line) and access to water; a significant incremental annual change is also evident. Descriptive summary shows an annual growth rate of 12% for fixed line subscribers whereas for access to water, results illustrate a 4.2% annual mean. Standard deviation is also large, which suggests high variations in the number of yearly subscription in telecommunication. One thing is clear; that the annual growth in infrastructure (fixed line and access to water); in particular fixed line subscribers, is more than the growth in FDI inflows and GDP growth combined. **Figure 4.1: Trends in FDI, Real GDP growth and Infrastructure**



The Kurtosis, Skewness and Jarque-Bera statistics revealed that all the variables are normally distributed.

KNUST

Table 4.1: Descriptive Summary of Variables

	FIX D	WATR	GRW	FDI
Mean	12.00710	4.290780	1.686473	1.004161
Median	12.48323	4.319449	1.578541	0.971040
Maximum	12.83870	4.488942	2.642338	2.253084
Minimum	10.74963	4.044804	1.193922	-1.193399
Std. Dev.	0.760059	0.138703	0.354316	1.018600
Skewness	-0.656316	-0.295097	1.061376	-0.537117
Kurtosis	1.792207	1.807897	3.618310	2.527343
			4.481021	
Jarque-Bera	2.916621	1.621985		1.262601
Probability	0.232629	0.444417	0.106404	0.531900

4.3 Estimation Results

The question that poses on any critical mind, given the trends in the observed variables is; does the FDI inflow have any significant influence on the GDP growth and infrastructure? To answer this question requires a time series analysis of the equations specified in the previous chapter.

4.3.1 Unit Root Tests Results

Due to the challenges associated with time series data, there was then a need to take steps to ensure that the data was reliable for any analysis. A unit root test is performed to examine if the series (both endogenous and exogenous) have any time dependence as is characteristic of time series data. The time dependence of any time series is referred to as non-stationarity. Granger

r and Newbold (1974) demonstrated that if two independent non-stationary series are regressed on each other the chances of attaining a spurious relationship is very high.

Table 4.2 depicts the results of the Dickey-Fuller Generalized Least Squares unit root tests. The relevance of the unit root testing is to ensure that all the variables are $I(0)$ before any regression analysis is performed. The results show that the null of non-stationarity is to be rejected at 5% critical values at levels for GD growth, labour (after trending), investments, net exports, inflation and interest rates. However, FDI, exchange rate, population size and infrastructure proxied by number of telephone subscribers were first difference stationary.

Table 4.2: Dickey-Fuller Generalized Least Squares Unit Root Tests

Variables	Test for Unit root	ADF-GLS Statistic	Order of Integration	Lag length (based on SIC)
Growth	Level	-2.645**	Stationary	0
	First Difference	-5.602***	Stationary	0
FDI	Level	-1.490	Not Stationary	0
	First Difference	-4.065***	Stationary	0
Infrastructure	Level	-1.537	Not Stationary	1
	First Difference	-2.589**	Stationary	0
Labour	Level +	-1.604	Stationary	1
	First Difference	-3.010*	Not Stationary	0
Investment	Level	-4.360***	Stationary	0
	First Difference +	-6.266***	Stationary	4
Open	Level	-2.946***	Stationary	0
	First Difference	-6.828***	Stationary	0
Inflation	Level	-2.597**	Stationary	0
	First Difference	-5.439***	Stationary	0
Exchange Rate	Level	-1.075	Not Stationary	0
	First Difference	-3.771***	Stationary	0

Int r s t Rat s	L v l	-1.787*	Stationary	0
	First Diff r nc	-4.311***	Stationary	0
o ulation siz	L v l	-0.349	Not stationary	2
	First Diff r nc +	-4.950***	Stationary	0
GD r ca ita	L v l	-0.365	Not stationary	1
	First Diff r nc +	-3.624****	Stationary	0
Wat r	L v l	1.678*	Stationary	0
	First Diff r nc +	-3.463 **	Stationary	0

***, **& * d n o t s t h r j c t i o n o f t h n u l l h y o t h s i s o f n o n - s t a t i o n a r i t y a t 1, 5 a n d 10 r c n t s s i g n i f i c a n c l v l s r s c t i v l y.

+Stationary with tr nd and int rc t

4.3.2 R s a r c h O b j c t i v s 2: A n t c d n t s t o F D I I n f l o w s

Th r s u l t s o f t h D G L S u n i t r o o t t s t s a s d i s l a y d o n T a b l 4.2 a b o v i n d i c a t t h a t m o s t o f t h v a r i a b l s a r s t a t i o n a r y a t l v l s x c t f o r F D I, o ulation s i z , a n d x c h a n g r a t s w h i c h a r f i r s t o r d r s t a t i o n a r y. c o n o m t r i c i a n s c o n c l u d t h a t g n r a l l y w h n v a r i a b l s o f d i f f r i n g o r d r s o f i n t g r a t i o n a r c o m b i n d i n a r g r s s i o n, t h c o m b i n a t i o n w i l l h a v a n o r d r o f i n t g r a t i o n q u a l t o t h l a r g s t. A s a r s u l t s i n c a l l t h v a r i a b l s a r $I(1)$ s t a t i o n a r y, i t w a s c o n s i s t n t t o c o n c l u d t h a t t h s r i s a r i n t g r a t d o f o r d r o n . I t i s s u g g s t d b y n g l a n d G r a n g r (1987) t h a t m a c r o c o n o m i c n o n - s t a t i o n a r y t i m s r i s v a r i a b l s m a y b m o v i n g t o g t h r i n d n d n t l y o v r t i m s c i a l l y a l o n g t h b u s i n s s c y c l . T h u s a l i n a r c o m b i n a t i o n o f t h s v a r i a b l s i n a m o d l m a y l a d t o a s u r i o u s r g r s s i o n t h a t s u g g s t s r l a t i o n s h i s v n w h n t h r a r n o n . H o w v r i f a l i n a r c o m b i n a t i o n o f t h s v a r i a b l s i s s t a t i o n a r y $I(0)$, t h n t h v a r i a b l s a r s a i d t o b c o - i n t g r a t d ; h n c t h y h a v a l o n g - r u n r l a t i o n s h i . T h a t i s c o - i n t g r a t i o n i s s a i d t o x i s t b t w n t w o o r m o r n o n - s t a t i o n a r y t i m s r i s i f t h y o s s s t h s a m o r d r o f i n t g r a t i o n a n d a l i n a r c o m b i n a t i o n

(weight d a v rag) of th s s r i s is stationary. Since som of th obs r v d variabl s ar non-stationary, it is rud nt t o ch ck if a co-int grat ion r lat ionshi x ists b f or th actual mod l ing is conduct d. Th im lication is that non-stationary variabl s can l ad t o s urious r gr ss ions unl ss at l a st on coint grat ion v ct or is r s nt m an s that som form of t s ting for coint grat ion is almost mandatory.

B f or FDI mod l is s timat d, t h Johans n c o-int grat ion t s t is r form d. Tabl 4.3 and 4.4 r ort th r s ults of th Lik l ihood Ratio t s ts bas d on th Trac and th Maximum i g n valu of th stochastic matrix r s ct iv ly. B oth th s t sts confirm th x ist nc of thr coint grat ing v ct ors b tw n t h variabl s , i. . t h x ist nc of long-run r lat ionshi b tw n t h m.

Tabl 4.3: Coit grat ion Rank T s t (Trac)

	0.05	
Critical Valu		rob.**
		0.0000
47.85613		
29.79707		0.0016
15.49471		0.0330
3.841466		0.1317
l v l		
n valu)		
	0.05	
Critical Valu		rob.**

Hypothesized		Trace	27.58434	0.0007
No. of C (s)	Eigenvalue	Statistic	21.13162	0.0155
			14.26460	0.0474
Non *	0.867480	81.71521	3.841466	0.1317
At most 1 *	0.707920	41.29479		
At most 2 *	0.513450	16.68021		
At most 3	0.107380	2.271881		

Trace test indicates 3 co-integrating cointegration at the 0.05

* denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) -values

Table 4.4: Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen
No. of C (s)	Eigenvalue	Statistic
Non *	0.867480	40.42043
At most 1 *	0.707920	24.61458
At most 2 *	0.513450	14.40833
At most 3	0.107380	2.271881

Max-Eigenvalue test indicates 3 co-integrating cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

Since the variables are cointegrated, they can be represented equivalently in terms of a long run Fully Modified Least Squares framework (FMOLS) of Phillips and Hansen (1990). The FMOLS is also shown to give better estimates in small samples.

$$FDI = \beta_0 + \beta_1 FDI_{t-1} + \beta_2 POP + \beta_3 INF + \beta_4 OPEN + \beta_5 RE + \beta_6 RISK + \beta_7 GRW + \beta_8 IR + \varepsilon$$

----- (4.1)

The FMOLS is applied to estimate determinants of FDI inflows in Ghana using equation 3.2 as specified in the previous chapter. The econometric model of equation 3.1 is specified above in equation 4.1; where FDI is the log of the FDI inflows, POP is the ratio of the log of the ratio of population size to GDP. This was introduced in the modelling to depict the production capacity of the economy; against the growing market size. Higher ratios do not lower capacity, as the size of the population is growing faster than the economy can allow. For a sense of interest rate, POP was inverted by multiplying by -1 and mean adjusted by adding 1. Any ratio above unity; therefore implied that output was growing above the size of the market. INF is the log of inflation rates. $OPEN$ represents the log of total trade volume (exports + imports) as a percentage of GDP. This was to measure the level of openness of the economy. RE is the standard deviation of the log difference of the real exchange rates around its annual mean. This is to proxy the volatility in the US dollar/Ghana Cedi exchange rate. Risk is a dummy of election year; GRW represents the log of the real GDP growth rates, IR denotes the level of the nominal interest rate proxied by the 91-day treasury bill whilst ε_t is the disturbance term.

To initial the analysis, a descriptive and correlation analysis were performed. Table 4.5a and Table 4.5b present the summary and correlation statistics of the independent and dependent variables averaged over the 1990-2015 time period. Results show a considerable annual variation in the production capacity (O), inflation rate, interest rates and openness. Table 4.5b reporting the results of the correlation analysis reveal that there is no problem of multicollinearity among the variables. Though not suggesting causality, the correlation table depicts a positive relationship between FD

FDI inflows, and production capacity (O) and growth. A negative association was however suggested in its links with exchange rate fluctuations, inflation, openness, interest rates and the risk factor.

Table 4.5a: Correlation Matrix

	FDI	R	ON	GRW	O	INF	YD	IR
FDI	1.000							
R	-0.360	1.000						
ON	-0.455	-0.387	1.000					
GRW	0.488	0.225	-0.941	1.000				
O	0.199	0.167	0.131	-0.193	1.000			
INF	-0.507	0.042	0.550	-0.605	0.473	1.000		
YD	-0.087	-0.260	-0.109	0.188	0.361	0.049	1.000	
IR	-0.344	-0.222	0.587	-0.586	0.388	0.740	0.224	1.000

Table 4.5b: Summary Statistics 1990-2014

Mean	0.498	0.990	-0.037	2.698	1.665	2.854	0.250	3.151
Median	0.475	0.971	-0.006	2.789	1.562	2.728	0.000	3.228
Maximum	0.823	2.253	0.144	3.633	2.642	4.085	1.000	3.868
Minimum	0.187	-1.193	-0.424	1.687	1.193	2.166	0.000	2.261
Std. Dev.	0.149	0.978	0.127	0.501	0.346	0.512	0.442	0.491
Skewness	0.290	-0.512	-1.374	-0.152	1.184	0.723	1.154	-0.356

Kurtosis	2.895	2.665	4.971	2.394	3.909	2.780	2.333	2.142
	O	FDI	R	O N	GRW	INF	YD	IR
Jarqu - B ra	0.250	1.161	10.96	0.459	6.439	2.139	5.777	1.243
robability	0.882	0.559	0.004	0.794	0.039	0.343	0.055	0.537

Source : Author (2016)

Table 4.6 reports the results of the long run FMOLS estimation of equation 4.1. It is shown that the openness, GDP growth rate, exchange rate fluctuations, political risks and previous level of FDI inflows have a strong impact on current FDI inflows at 5% significant level. In literature however, Jordaan (2004) claims that the impact of openness on FDI depends on the type of investment. When investments are market-seeking, trade restrictions (and therefore less openness) can have a positive impact on FDI. Kravis and Lisy (1982), Culm (1988), Edwards (1990) also find a strong positive effect of openness on FDI and Schmitz and Bri (1972) obtain a weak positive link. The current study therefore supports previous findings made by other researchers.

Meanwhile production capacity, the inflation rate and the current level of interest rates did not have any impact on current FDI inflows. Results indicate that a higher fluctuation in the exchange rate has a detrimental effect on current inflows. The coefficient of -4.439332 of R indicates that any 10% increase in the exchange rate around its mean will result in a 44.4% decline in FDI inflows. Furthermore, the results support the tariff-jumping hypothesis which states that for foreign firms which seek to serve local markets may decide to set up subsidiaries in the host country if it is

difficult to import their products to the country. The study results show that a 10% tightening of Ghana's trade "windows" results in a 23% reduction in FDI inflows.

Again, results indicate that the more risky the political landscape in Ghana is, the less the amount of inflows received. In particular as the country gravitates from non election year to an election year, there is a significant reduction in FDI inflows by 0.3%. However, the study results show that previous level of FDI inflows have a positive effect on current level of FDI inflows significant at 1%.

Table 4.6: Determinants of FDI Inflows

Variable		Expected sign	Coeff.	Std. error	t-Statistic	Prob.
		-v				
Exchange rate volatility	R		-4.4393	0.6696	-6.6291	0.000
Openness	ON	-v/+v	-2.3364	0.4282	-5.4560	0.000
Real GDP growth	GRW	-v/+v	-2.3142	0.5197	-4.4522	0.000
Production Capacity	O	+v	0.1563	0.1237	1.2636	0.230
Inflation Rate	INF	-v	-0.1175	0.1569	-0.7491	0.468
Political Risk	YD	-v	-0.3242	0.1492	-2.1732	0.050
Nominal Interest Rate	IR	+v	0.0326	0.1598	0.2044	0.841
Lagged FDI	FDI(-1)	+v	0.4938	0.0869	5.6813	0.000
Constant	C		11.049	1.9158	5.7672	0.000
R-squared			0.907272	Mandelbrot standard deviation		1.202934
Adjusted R-squared			0.845453	S.D. of standard deviation		0.778024
Sum of squared residuals			0.305861	Sum of squared residuals		1.122612
Durbin-Watson stat			2.642421	Long-run variance		0.043246

Dependent Variable : FDI

Source : Author (2016)

These results also show that GD growth has a long run negative relationship with FDI inflows. Specifically a 10% increase in GD growth will induce a more than 23% reduction in FDI inflows. This suggests that scenario of “retaliation” effect associated with increased FDI; where multinational firms push out domestic firms without FDI out of the market. The model’s explanatory power using the adjusted R^2 is validated at around 85 percent. The implication is that 85% of the variations in FDI inflows can be explained by the economic and legal/political factors included in the regression model. Based on this the study proceeded to examine how FDI inflows also influence real GD growth.

4.3.3 Research Objectives 3: The effect of FDI Inflows on Growth

Based on the FDI-Growth model specified in equation 3.5, the effect of FDI inflows on real GD growth was also investigated. Again before any empirical analysis was conducted, there was then needed to check for possible cointegration among the variables. The Johansen cointegration test was consequently performed. Table 4.7 and 4.8 report the results of the Likelihood Ratio tests based on the Trace and the Maximum eigenvalue of the stochastic matrix respectively. Both tests confirmed the existence of the cointegrating vectors between the variables.

Table 4.7: Cointegration Rank Test (Trace)

Hy oth s iz d		Trac	0.05	
No. of C (s)	i g n valu		Critical Valu	rob.**
		Statistic		
Non *	0.990487	129.4588	47.85613	0.0000
At most 1 *	0.729520	41.01283	29.79707	0.0017
At most 2 *	0.485140	16.16922	15.49471	0.0395
At most 3	0.170682	3.555881	3.841466	0.0593

Trac t s t indicat s 3 coint grat ing qn(s) at th 0.05 l v l

* d n ot s r j ct ion of th hy oth s is at th 0.05 l v l

Tabl 4.8: Coit grat ion Rank T s t (Maximum i g n valu)

Hy oth s iz d		Max- i g n	0.05	
No. of C (s)	i g n valu		Critical Valu	rob.**
		Statistic		
Non *	0.990487	88.44594	27.58434	0.0000
At most 1 *	0.729520	24.84361	21.13162	0.0143
At most 2	0.485140	12.61334	14.26460	0.0897
At most 3	0.170682	3.555881	3.841466	0.0593

Max- i g n valu t s t indicat s 2 coit grat ing qn(s) at th 0.05 l v l

* d n ot s r j ct ion of th hy oth s is at th 0.05 l v l

**MacKinnon-Haug-Mich lis (1999) -valu s

Th us of th Fully Modifi d L a st Squar s (FMOLS) s timation is justifi d on th obs r vanc of coit grat ion among th variabl s . Th s c ification of th FDI-Growth mod l wa s th r f or giv n a s:

$$GRW = \beta_0 + \beta_1 GRW_{t-1} + \beta_2 HC + \beta_3 FDI + \beta_4 INV + \beta_5 GPC + \varepsilon \text{-----}(4.2)$$

Where FDI represents the log of FDI inflows to the country. HC is the interactive term of human capital (proxied by the school enrolment at JHS) and FDI. Guntlach ((1995) argues that the allocation of technology embodied in FDI inflows requires sufficient level of human capital for it to draw any meaningful impact on the growth. INV represents the domestic capital formation and GPC is the real GDP growth. It is argued that the existence of an adequate market is an essential prerequisite to raising the full benefit of FDI. Since the domestic market in Ghana has a unique character, it is necessary to check how it has impacted on FDI. This therefore motivated the inclusion of GPC in the model. To capture the effect of convergence, lagged real GDP growth is included. All the variables are specified in logs.

Table 4.9a and table 4.9b report the descriptive and correlation statistics among the explanatory variables. It is shown that high variations exist in the human capital series and FDI. It is also shown that all the variables correlate positively with real GDP growth.

Table 4.9a: Summary Statistics of independent variables – Growth model

	GRW	HC	FDI(predicted values)	INV	GPC
Mean	1.665	2.028	0.123	0.289	1.902
Median	1.562	0.680	1.073	0.346	1.893
Maximum	2.642	24.50	4.011	0.874	1.965
Minimum	1.193	-13.08	-6.046	-0.089	1.864
Std. Dev.	0.346	8.063	2.635	0.217	0.032
Skewness	1.184	0.629	-0.732	0.284	0.700
Kurtosis	3.909	4.020	2.861	3.905	2.319

Jarque - Bera probability	6.439	2.517	1.895	1.047	2.424
	0.039	0.283	0.387	0.592	0.297

Table 4.9b: Correlation Matrix

		HC	FDI	INV	G C
Growth					
Growth	1.000				
HC	0.020	1.000			
FDI	0.307	0.523	1.000		
INV	0.020	0.457	0.656	1.000	
G C	0.446	0.062	0.380	0.27	1.000

Two (2) estimation approaches were used to capture the effects of FDI on growth. The first one involved a 2SLS approach, where the predicted values of equation 4.1 were used to represent FDI in the current model (see Table 4.10a). This was in an attempt to correct for possible simultaneity and endogeneity in the growth model. Nonetheless the actual values of the log of FDI inflows were used in the second estimation and the results compared (see Table 4.10b).

Table 4.10a: The effect of FDI on Growth (2SLS Approach)

Variable		Expected sign	Coefficient	Std. error	t-Statistic	Prob.
Investment	INV	+v	0.5802	0.1628	3.5631	0.002

GD r ca ita	G C	+v	2.2157	0.5886	3.7642	0.001
FDI inflows ^a	FDI	-v /+ v	-0.9520	2.4574	-0.3873	0.703
Human Ca ital	HC	+v	0.0650	0.1737	0.3745	0.713
Lagg d GD Growth	GRW(-1)	-v	-0.3828	0.1651	-2.3188	0.034
Constant	C		-12.689	3.7657	-	0.002
R-squar d			0.778752	M an d	nd nt var	1.693694
Adjust d R -squar d			0.705003	S.D. d	nd nt var	0.358131
S. . of r gr ss ion			0.194514	Sum squar d r s id		0.567535
Durbin-Watson stat			2.048404	Long-run varianc		0.019192

A: r d ict d valu s of FDI from quat ion 4.1

D nd nt Variabl : GRW

Sourc : Author (2016)

Tabl 4.10b: Th ff ct of FDI on Growth (Dir ct A roach)

Variabl		x ct d signs	Co ff ici nt	Std. rr or	t-Statistic	rob.
Inv s tm nt	INV	+v	0.4658	0.2118	2.1988	0.044
GD r ca ita	G C	+v	2.3217	0.4347	5.3408	0.000
FDI inflows ^b	FDI	-v /+ v	-0.0637	0.0768	-0.8285	0.420
Human Ca ital	HC	+v	0.1553	0.1572	0.9751	0.345
Lagg d GD Growth	GRW(-1)	-v	-0.3935	0.1920	-2.0489	0.050
Constant	C		0.0015	0.0061	0.2520	0.804

R-squared	0.789216	Adjusted R-squared	1.693694
Adjusted R-squared	0.718954	Standard Error of the Estimate	0.358131
Standard Error of the Estimate	0.189859	Sum of Squares	0.540695
Durbin-Watson stat	1.976936	Long-run Variance	0.027549

B: Actual log values of FDI

Dependent Variable: GRW

Source: Author (2016)

Results show that among the control variables used in the FDI-Growth model, investment, GDP per capita, and lagged GDP growth rate have a strong impact on real GDP growth rate. 10 percent increase in investment is shown to have 5.8 percentage points increase in GDP growth in the first model (Table 4.10a); whilst on Table 4.10b it observed to have a 4.7% increase in GDP growth. Second, it is shown that market size also impacts on growth. A 10% increase in GDP per capita is shown to have a long run increase in GDP growth rate by 22% in Table 4.10a and 23% in Table 4.10b. Results also confirmed the indication of convergence in the GDP growth rate. The coefficient of lagged GDP growth rate is negative and significant at 5% in both models. In regression Table 4.10a the coefficient of lagged GDP growth rate corresponds to a 0.38 percentage points while on Table 4.10b, it corresponds to a 0.39 percentage points to its long run equilibrium state. FDI was shown not to draw any significant impact on growth in both models. The strength of both models is validated by the adjusted R-squares of 70.5% in the first model and 71.9% in the second model. This result is not different from what was found in literature, the results by Ramírez (2000) indicated that for the period 1960-1995, FDI Granger-causes growth in Mexico. The study also established a positive relationship between FDI and growth in both the short and the long run relationships. In addition, Athukorala (2003) examined the relationship between FDI and growth using time series data from

the Sri-Lankan economy. The econometric results showed a positive and significant relationship between FDI and economic growth. Furthermore, Looss et al. (2010) examined the linkage and directional causality between FDI and growth of ten Sub-Saharan African countries using annual time series data from 1970 to 2007. They employed the Alogoskoufis et al. (2001) approach to cointegration and the Toda and Yamamoto (1995) causality test and realized a positive and significant long run relationship between FDI and GDP growth in Angola, Liberia, Kenya and South Africa. However, they found a unidirectional causality running from FDI to GDP growth. Both Looss et al. and Ogiagah et al. have the same opinion on the relationship between FDI and growth.

4.3.4 Research Objective 4: The Effect of FDI Inflows on Infrastructure

Among various factors as a determinant of FDI inflows, infrastructure development is widely considered as a crucial factor influencing the desirability of investment location. The examination of the role of infrastructure development is important particularly for developing economies, such as Ghana, since developing infrastructure is one of the main processes to attract domestic and foreign investments.

Following the previous approaches, the use of the FMOLS framework was made to assess the effect of FDI inflows on infrastructure. In principle, it was necessary to check if a linear combination of the sum of the non-stationary series would be stationary. The Likelihood Ratio tests based on the Trace and the Maximum Eigenvalue of the stochastic matrix were checked and results are presented on Tables 4.11a and 4.11b respectively. Both tests confirmed the existence of two cointegrating vectors between the variables.

Tabl 4.11a: Cointegration Rank Test (Trace)

Hy oth s iz d No. of C (s)	i g n valu	Trac Statistic	0.05 Critical Valu	rob.**
Non *	0.772297	47.10392	29.79707	0.0002
At most 1 *	0.721417	21.94883	15.49471	0.0046
At most 2	0.012985	0.222194	3.841466	0.6374

Trace test indicates 2 cointegrating equation(s) at the 0.05 level

* do not reject the hypothesis at the 0.05 level

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

Tabl 4.11b: Cointegration Rank Test (Maximum Eigenvalue)

Hy oth s iz d No. of C (s)	i g n valu	Max- i g n Statistic	0.05 Critical Valu	rob.**
Non *	0.772297	25.15509	21.13162	0.0128
At most 1 *	0.721417	21.72664	14.26460	0.0028
At most 2	0.012985	0.222194	3.841466	0.6374

Max-eigenvalue test indicates 2 cointegrating equation(s) at the 0.05 level

* do not reject the hypothesis at the 0.05 level

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

Having justified the use of the Fully Modified Least Squares (FMOLS) process, the study commenced to model the FDI-Infrastructure relationship. The econometric model of equation 3.6 in chapter 3 was therefore specified as:

$$Infra = \beta_0 + \beta_1 Infra_{t-1} + \beta_2 Lab + \beta_3 FDI + \beta_4 INV + \beta_5 Grw_{t-1} + \beta_6 Year + \varepsilon$$

----- (4.3)

Where *Infra* is the log of infrastructure (proxied by the number of fixed line subscriptions and access to quality water). *FDI* represents the log of FDI inflows. The model controls for the effect of labour force, *Lab*; investments, *INV*; GDP growth rates, *GRW*; and time, *Year*. All the variables are specified in logs.

Similarly, two (2) estimation approaches were used to capture the effects of FDI on infrastructure. The first one involved a 2SLS approach, where the predicted values of equation 4.1 were used to represent FDI in the current model (see Table 4.12a). Again, this was in an attempt to correct for possible simultaneity and endogeneity in the model; i.e. capturing the effects of other factors which may also influence the level of infrastructure but not included in the modelling. Nonetheless, the actual values of the log of FDI inflows were used in the second estimation and the results compared (see Table 4.12b). It is important to clarify at this point that the effect of FDI will be assessed individually on infrastructure in the telecommunications (fixed line subscriptions) and then access to quality and portable water under each approach.

Results show that FDI inflows have a negative impact on infrastructure. In the first model, under both accessibility to water and fixed line subscriptions, the results revealed a significant negative

effect. According to ODI (1997), poor infrastructure can be seen, however, as both an obstacle and an opportunity for foreign investment. For the majority of low-income countries, it is often cited as one of the major constraints. But for foreign investors also point to the potential for attracting significant FDI if host governments make more substantial for foreign participation in the infrastructure sector. Jordaan (2004) claims that good quality and well-developed infrastructure increases the productivity potential of investments in a country and therefore stimulates FDI flows towards the country.

In the second model, under the direct approach, results showed that for telecommunications there is strong negative impact ($B = -0.238$; $< 5\%$); but its effect on water is rather weak though also negative. This result is rather interesting, given the fact that most FDI Ghana has received in recent times are directed to the extractive industry, and in particular mining; where their activities are suggested to have a detrimental third party effects on the surrounding communities. Again, it is shown in both models that there are significant increases in infrastructure annually.

Table 4.12a: The effect of FDI on Infrastructure (2SLS Approach)

Variables	TELECOMMUNICATION			WATER		
	Coefficient	t-Statistic	Sig.	Coefficient	t-Statistic	Sig.

For i gn Dir ct	FDI	-	-0.379	-2.269	0.05	7	-0.001	-	0.0
Inv s tm		v /+ v						2.29	4
nt ^a									
Inv s tm nt	NV	+v	0.72	1.873	0.10	3	0.001	0.78	0.4
Y ar	Year	+v	0.127	3.921	0.00	5	0.056	2.61	0.0
Labour	Lab	-v	-0.554	-1.642	0.14	4	0.005	5.29	0.0
Lagg d GD growth	Grw _{t-1}	-v / v	-0.916	-3.908	0.00	5	-0.003	-	0.0
lagg d infrastru	Infra _{t-1}	+v	0.312	1.877	0.10	2	0.683	12.5	0.0
Constant	C		-245.8	-3.878	0.00	6	1.313	5.92	0.0
R-squar d			0.913				0.999		
Adjust d R -squar d			0.839				0.999		
S. . of r gr ss ion			0.238				0.002		
Durbin-Watson stat			2.559				2.337		
M an d nd nt var			12.22				4.320		
S.D. d nd nt var			0.594				0.099		
Sum squar d r s id			0.397				5.41 - 05		
Long-run varianc			0.027				1.75 - 06		

A: r d ict d valu s of FDI from quat ion 4.1

D nd nt Variabl : Infrastructur

Source : Author (2016)

R s ults show a rang of b tw n 0.10% - 0.12% for t l c ommunication annually; bas d on Tabl 4.12b and Tabl 4.12a dis lays. For wat r, it is shown that acc ss to wat r incr a s s by th rang of 0.004% to 0.056% y arly. Th r s ults ar all significant at l ss than 5% critical l v l s. Furth rm or th r s ults show that rc ntag incr a s s in labour do s not draw any ff ct on t l c ommunication infrastru ; rat h r on wat r in both s timations. For Tabl 4.12a, it is shown that

10% increase in labour draws a 0.05% increase in accessibility; whereas for Table 4.12b, it is shown to induce a 0.7%, significant at less than 1%. The study also found evidence to suggest that previous growth in infrastructure has a strong positive impact on current growth in infrastructure. For telecommunications, it is shown that lagged infrastructure induces 0.3% and 0.4% increase in current infrastructure in Table 4.12a and Table 4.12b respectively.

Table 4.12b: The effect of FDI on Infrastructure (Direct Approach)

Variables	TELECOMMUNICATION				WATER		
	Coefficient	t-Statistic	Sig.		Coefficient	t-Stats	Sig.
Foreign Direct Investment ^b	-0.238	-2.336	0.044		-0.001	1.692	0.11
Investment	0.616	1.741	0.115		0.001	0.543	0.59
Year	0.109	4.730	0.001		0.004	4.669	0.00
Labour	6.091	1.259	0.239		0.068	3.197	0.01
Lagged GD growth	-0.813	-3.380	0.001		-0.001	1.065	0.30
lagged infrastructure	0.442	2.979	0.015		0.751	16.20	0.00
Constant	6.935	4.340	0.001		1.033	5.477	0.00
R-squared	0.9358				0.999		
Adjusted R-squared	0.8930				0.999		
Standard error	0.2406				0.002		
Durbin-Watson stat	2.1577				2.321		
Mean dependent var	12.049				4.300		
S.D. dependent var	0.7358				0.113		

Sum square d r s id	0.5213	5.73 - 05
Long-run varianc	0.0267	1.90 - 06

B: r d ict d valu s of FDI from quat ion 4.1

D nd nt Variabl : Infrastructure

Source : Author (2016)

For wat r acc ss ibility, r s ults show that it induc s 0.68% incr a s in curr nt infrastru ctur (in Tabl 4.12a) wh r a s in th s c ond mod l it is shown to induc a 0.75% incr a s on curr nt infrastru ctur . Th r s ults on th long run im act of GD growth wr int r s ting. In both mod l s, it is shown that as th c onomy grows; th numb r of fix d l in subscrib r s d t r iorat s at 0.9% in th first mod l and 0.8% in th s c ond mod l. Similar r s ults was found for wat r; how v r w hilst th first mod l show d a strong n gat iv im act ($B = -0.003$; $< 10\%$), th s c ond mod l r v al d t hat th r lat ionshi was rath r w ak. Th robustn ss t s ts for th mod l s wr all good; showing a good fit b tw n th mod l s and th data. Th adjust d R -Squar s also validat d all th mod l s ranging from 83% to 99%.

4.4 Discussion of r s ults

This work focus d on inv s tigating th causal r lat ionshi s b tw n c onomic growth, FDI and infrastru ctur . First th r s ults of th study rov s th t r i gn dir ct inv s tm nt is influ nc d n gat iv ly by such factors including fluctuations in th l v l of xc hang rat s , trad o nn ss and th olitical landsca . Th r s ults on trad o nn ss rovid v id nc for th tariff-jum ing or x ort substitution hy oth s is which stat s that as trad o nn ss contracts, for i gn inv s tors ar lik ly t o s t u dom s tic subsidiary com ani s in ord r t o ov rc om th im ort r s trictions.

Again, th work rovid d su ort for th r s ults of Schn i d r and Fr y (1985); a s w ll a s Lor and Guising r (1995) w ho found that for i gn inv s tors and for that matt r FD I inflows ar lik ly to

hold back or reduce when there is a reason to suspect that the political economy is risky. Meanwhile, the study results show that exchange rate volatility is a major disincentive to the choice of the Ghana as an FDI destination as it adds to the list of financial risks that must be borne by investors. Particularly the work supports a similar study conducted by Ogunleye (2009) using Nigeria and South Africa as a case study. The author found that exchange rate volatility has a detrimental effect on FDI inflows, with FDI inflows aggravating exchange rate volatility in both countries. Moreover, studies such as Tokunbo and Lloyd (2009) in Nigeria; Kyriakopoulos and Tett (2008) in Ghana; and Kiyota and Urata (2004) provide empirical evidence to support the conclusion that exchange rate volatility has a harmful effect on FDI inflows. It is therefore required of the Bank of Ghana to endeavour to obtain a stable exchange rate in the long term so that reduction is enhanced to bring about a positive increase in real FDI along with internal and external balance maintenance. The harmful effect of an unstable exchange rate lies in the fact that it could potentially reduce investors' vitality and make it difficult to forecast or plan.

Interestingly relating to the relationship between GDP growth and FDI, the study results reveal a unidirectional causality between the two variables; unlike the bidirectional relationship suggested in some empirical studies. Specifically it is found that whilst GDP growth has a negative and significant impact on FDI; FDI has a weak but negative effect on growth. Carkovic and Levin (2002) for instance tried to establish the relationship between FDI and economic growth for 72 countries over the period 1960-1995. Their results indicated that for both developed and developing economies FDI inflows did not exert an independent influence on economic growth. Specifically the logarithmic component of FDI did not exert a reliable positive impact on economic growth, even allowing for the level of education, the level of economic development, the level of financial development and trade openness of the recipient country. Meanwhile, Barril and Bain

(1999) concluded that FDI may affect the host country's performance positively in cases where the transfer of technology and knowledge through the FDI to the host economy. The study results show that there is the so-called "crowding out" effect in Ghana, where multinational firms push out domestic firms without FDI out of the market. Relating to the determinants of economic growth, it is shown by the results that, investment, GDP per capita, and lagged GDP growth rate have a strong impact on real GDP growth rates. More interestingly, we found evidence of convergence in the growth rate over time.

Focusing on the effect of FDI on infrastructure, the study results show that inflows have a negative impact on infrastructure; in particular, a strong negative effect was found for fixed-line subscription whilst in terms of access to water, a mixed effect was observed. This result is rather interesting, given the fact that most FDI Ghana has received in recent times are directed to the extractive industry, and in particular mining; where their activities are suggested to have a detrimental third-party effects on the surrounding communities. Relating to fixed-line as proxy for infrastructure, FDI is expected to lead to improvement in technological development – through the development of ICT and new improved mediums of communication. Since fixed-line is more analogue and traditional; the strong negative effect is to be expected. Meanwhile for water resources, whilst a negative effect was found, it is shown that in the direct model, the effect is weak whilst in the instrumental model; a strong negative impact was found. This therefore suggests that on the whole, increase in foreign direct investment have not led to any improvement in water accessibility in the country. More especially given the background that most of these investors are seeking to make huge returns on their investments, they may not be so much concerned about the environment or the community life. Typical examples are the detrimental activities of Chinese operators in the small-scale mining sector. It was in view of this that the government of Ghana in July, 2013

tasked a joint police, military and immigration team to flush out illegal mining operators which led to the arrest of over 270 Chinese and other foreign nationals. In Ghana, the principal environmental problems caused by small-scale mining activity are mercury pollution from gold processing, water pollution and land degradation.



CHAPTER IV

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings from the previous, conclusion and recommendations. As may be recalled from the previous chapter, the analysis sought to examine the impact of foreign direct investment on growth and infrastructure in Ghana using a descriptive summary of the annualized data from 1991 – 2015 and trend analysis of the key variables – FDI, growth and infrastructure. After testing the stationarity process of the observed variables, they were then transformed accordingly and then the estimations performed using a relevant model. This chapter deals with a more concise observation based on the study.

5.2 Summary of Findings

Below is a summary of findings made from the previous chapter:

5.2.1 Objective 1: The pattern of FDI inflows in Ghana over the last two decades

The study found a general increase in the inflows of foreign investment over the same period; however, it is shown that between 1994 to 2002 sharp falls in the FDI inflows were present. It however assumed its steady rise onwards to 2014. The study also found that average growth rate for the 25-year period was 0.99% far less than the annual change in GDP growth of 1.66% for the data span. Standard deviation of both the GDP growth and FDI inflows

indicates that for the last 25 years FDI has been more volatile than the GDP growth. This reflects the fact that much variability is observed in the annual FDI inflows unlike in GDP growth.

Regarding infrastructure, proxied by the total number of telephone subscribers (fixed line) and access to water; a significant incremental annual change is also evident. The study found an annual growth rate of 12% for fixed line subscribers whereas for access to water, results illustrate a 4.2% annual mean. The study also found that the annual growth in infrastructure (fixed line and access to water); in particular fixed line subscribers, is more than the growth in FDI inflows and GDP growth combined.

5.2.2 Objectives 2: Antecedents of FDI Inflows into Ghana

An initial analysis was performed using descriptive and correlation. The study found a considerable annual variation in the production capacity (OP), inflation rate, interest rates and openness. Reporting the results of the correlation analysis revealed that there is no problem of multicollinearity among the variables. Though not suggesting causality, the correlation table depicts a positive relationship between FDI inflows, and production capacity (OP) and growth. A negative association was however suggested in its links with exchange rate fluctuations, inflation, openness, interest rates and the risk factor.

The long run FMOLS estimation showed that **openness, GDP growth rate, exchange rate fluctuations, political risks and previous level of FDI inflows** have a strong impact on current FDI inflows at 5% significant level. Meanwhile the study found that production capacity, inflation rate and current level of interest rates did not have any impact on current FDI inflows. The study also

found that higher fluctuations in the exchange rates have a detrimental effect on current inflows. The coefficient of -4.439332 of R indicates that any 10% increase in the exchange rate around its mean will result in a 44.4% decline in FDI inflows.

The findings also supported the tariff-jumping hypothesis which states that foreign firms which seek to serve local markets may decide to set up subsidiaries in the host country if it is difficult to import their products to the country. The study results show that a 10% tightening of Ghana's trade "windows" results in a 23% enhancement in FDI inflows. Again, the findings indicate that the more risky the political landscape in Ghana, the lesser the amount of inflows received. In particular as the country gravitates from non-alignment to an alignment year, there is a significant reduction in FDI inflows by 0.3%. However, the study results show that various levels of FDI inflows have a positive effect on current level of FDI inflows significant at 1%.

The study also found that GDP growth has a long run negative relationship with FDI inflows. Specifically a 10% increase in GDP growth will induce a more than 23% reduction in FDI inflows. This suggests the scenario of "retaliation" effect associated with increased FDI; where multinational firms push out domestic firms without FDI out of the market. The model's explanatory power using the adjusted R^2 is validated at around 85 percent. The implication is that 85% of the variations in FDI inflows can be explained by the economic and legal/political factors included in the regression model.

5.2.3 Objectives 3: The effect of FDI Inflows on Growth

As part of the objectives of the study, the effect of FDI inflows on real GDP growth was also investigated. Two (2) estimations approaches were used to capture the effects of FDI on growth. The first one involved a 2SLS approach, where the predicted values of equation 4.1 (see previous chapter) were used to represent FDI in the current model (see Table 4.10a). This was in an attempt to correct for possible simultaneity and endogeneity in the growth model. Nonetheless the actual values of the log of FDI inflows were used in the second estimation and the results compared (see Table 4.10b).

The study found that among the control variables used in the FDI-Growth model, investment, GDP growth rate, and lagged GDP growth rate have a strong impact on real GDP growth rate. A 10 percent increase in investment is shown to have 5.8 percentage point increments in GDP growth in the first model (Table 4.10a); whilst in Table 4.10b it was observed to have a 4.7% increase in GDP growth.

The study also found that market size impacts on growth. A 10% increase in GDP growth rate is shown to have a long run increase in GDP growth rate by 22% in Table 4.10a and 23% in Table 4.10b (refer to previous chapter). Results also confirmed the indication of convergence in the GDP growth rate. The coefficient of lagged GDP growth rate is negative and significant at 5% in both models. In regression Table 4.10a (refer to previous chapter) the coefficient of lagged GDP growth rate corresponds to a 0.38 percentage points while in Table 4.10b, it corresponds to a 0.39 percentage points to its long run equilibrium state.

Interestingly, FDI was shown not to draw any significant impact on growth in both models. The strength of both models is validated by the adjusted R-squares of 70.5% in the first model and 71.9% in the second model.

5.2.4 Objectives 4: The Effect of FDI Inflows on Infrastructure

Following the previous approaches, the use of the FMOLS framework was made to assess the effect of FDI inflows on infrastructure.

The study found that FDI inflows have a negative impact on infrastructure. In the first model, under both accessibility to water and fixed line subscriptions, the results revealed a significant negative effect. In the second model, under the direct approach, results showed that for telecommunication, there is strong negative impact ($B = -0.238$; $< 5\%$); but its effect on water is rather weak though also negative. This result is rather interesting, given the fact that most FDIs that Ghana has received in recent times are directed to the extractive industry, and in particular mining; where their activities are suggested to have detrimental third party effects on the surrounding communities. Again, it is shown in both models that there are negative increases in infrastructure annually.

The findings show a range of between 0.10% - 0.12% for telecommunication annually; based on Table 4.12b and Table 4.12a displays (see previous chapter). For water, it is shown that access to water increases by the range of 0.004% to 0.056% yearly. The results are all significant at less than 5% critical levels. Furthermore, the results show that negative increases in labour do not draw any effect on telecommunication infrastructure; rather on water in both situations. For Table 4.12a, it is shown that 10% increase in labour draws a 0.05% increase in access to water; whereas for Table 4.12b, it is shown to induce a 0.7%, significant at less than 1%. The study also found evidence to suggest that previous growth in infrastructure has a strong positive impact on current growth in infrastructure. For telecommunication, it showed that lagged infrastructure induces 0.3% and 0.4% increase in current infrastructure (see Table 4.12a and Table 4.12b respectively).

For water accessibility, the study found that it induces 0.68% increase in current infrastructure (in Table 4.12a) whereas in the second model it is shown to induce a 0.75% increase on current infrastructure.

The results on the long run impact of GDP growth were interesting. In both models, it is shown that as the economy grows; the number of fixed line subscribers deteriorates at 0.9% in the first model and 0.8% in the second model. Similar result was found for water; however whilst the first model showed a strong negative impact ($B = -0.003$; $< 10\%$), the second model revealed that the relationship was rather weak. The robustness tests for the models were all good; showing a good fit between the models and the data. The adjusted R-Squares also validated all the models ranging from 83% to 99%.

5.3 Conclusion

This work focused on investigating the causal relationships between economic growth, FDI and infrastructure. First the results of the study reveal that foreign direct investment is influenced negatively by such factors including fluctuations in the level of exchange rates, trade openness and the political landscape. The results on trade openness provide evidence for the tariff-jumping or export substitution hypothesis which states that as trade openness contracts, for foreign investors are likely to set up domestic subsidiary companies in order to overcome the import restrictions. Again, the work provided support for the results of Schnيدر and Fry (1985); as well as Lora and Guisinger (1995) who found that for foreign investors and for that matter FDI inflows are likely to hold back or reduce when there is a reason to suspect that the political economy is risky. Meanwhile, the study results show that exchange rate volatility is a major disincentive to the choice of Ghana as

an FDI destination as it adds to the list of financial risks that must be borne by investors. Particularly, the work supports a similar study conducted by Ogunleye (2009) using Nigeria and South Africa as a case study. The author found that exchange rate volatility has a detrimental effect on FDI inflows, with FDI inflows aggravating exchange rate volatility in both countries. Moreover, studies such as Tokunbo and Lloyd (2009) in Nigeria; Kyriakopoulos and Tettey (2008) in Ghana; and Kiyota and Urata (2004) provide empirical evidence to support the conclusion that exchange rate volatility has a harmful effect on FDI inflows.

On the relationship between GDP growth and FDI, the study found a uni-dimensional causality between the two variables. Specifically, it is found that whilst GDP growth has a negative and significant impact on FDI; FDI has a weak but negative effect on growth. Carkovic and Levine (2002) for instance tried to reassess the relationship between FDI and economic growth for 72 countries over the period 1960-1995. Their results indicated that for both developed and developing economies FDI inflows did not exert an independent influence on economic growth. The study results show that there is the so-called “crowding out” effect in Ghana, where multinational firms push out domestic firms without FDI out of the market. Referring to the determinants of economic growth, it is shown by the results that, investment, GDP per capita, and lagged GDP growth rate have a strong impact on real GDP growth rates. More interestingly, we found evidence of convergence in the growth rate over time.

Focusing on the effect of FDI on infrastructure, the study results show that inflows have a negative impact on infrastructure; in particular, a strong negative effect was found for fixed-line subscription whilst in terms of access to water, a mixed effect was observed.

5.4 Recommendations

In line with the findings above, there are hereby made the following recommendations:

5.4.1 Correction of Microeconomic Imbalances

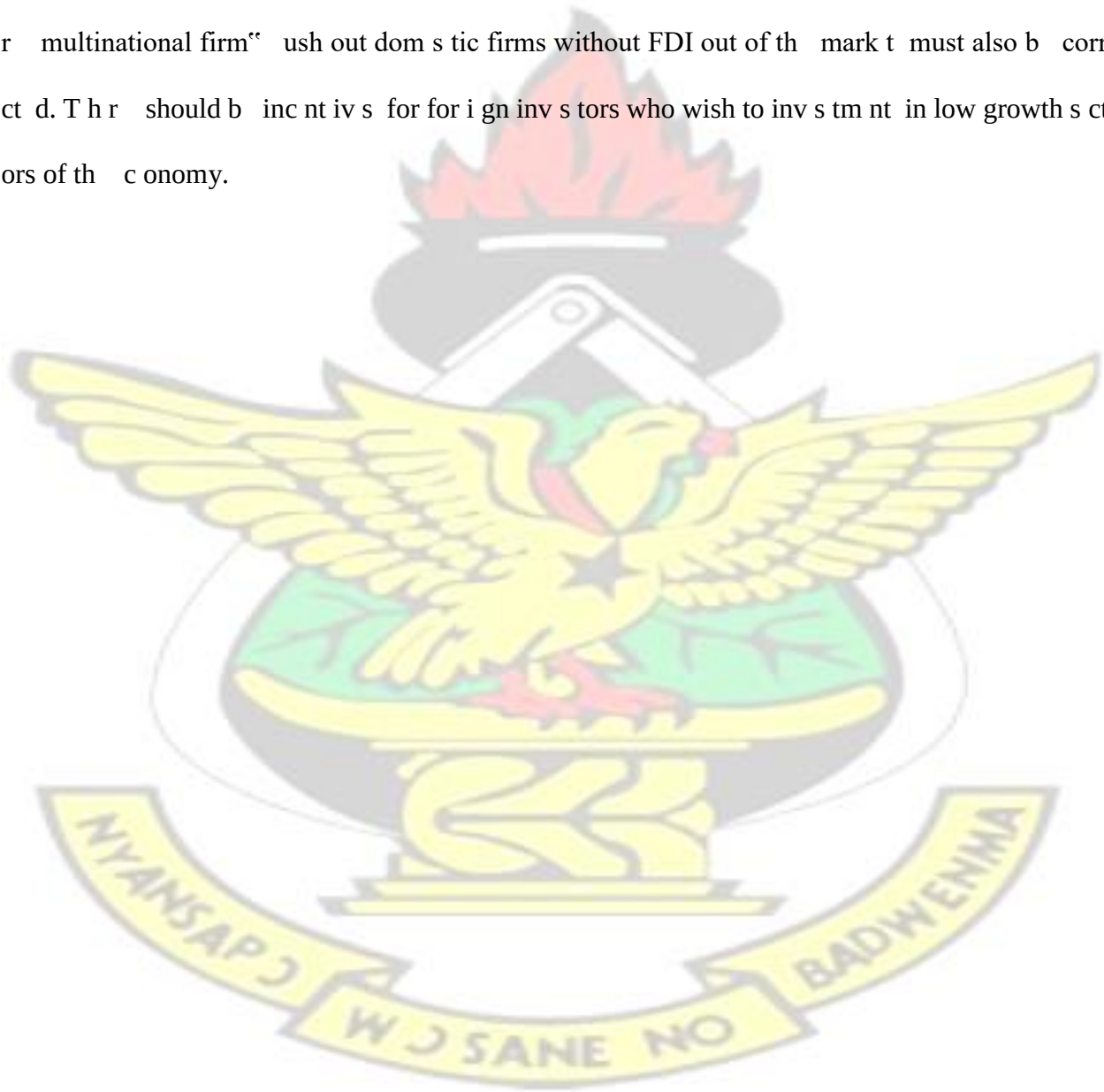
First, there is need for government to work at correcting macro economic imbalance. By this, the Bank of Ghana and the Ministry of Finance and Economic Planning must endeavour to obtain a stable exchange rate in real terms so that reduction is enhanced to bring about a positive increase in real FDI along with internal and external balance maintenance. The harmful effect of an unstable exchange rate lies in the fact that it could potentially reduce investors' ability and make it difficult to forecast or plan. Interest rates must be under control. More important is correcting the country's balance of payment deficit by reducing imports or promoting exports.

5.4.2 Redirecting of FDI to Growth Inducing Sectors

To achieve growth in infrastructure, Government should work at ensuring that FDI is attracted to sectors of the economy that directly trickle into growth. Even though areas such as water provision may not be attractive to some investors, government could tie them to Center for Scientific Research (CSR) activities when trying to renew licenses for these investors. Sectors such as Agriculture, Commerce and energy infrastructure should also be looked at. As shown in the 2016 budget estimates, Agriculture has performed woefully. There is therefore need to encourage investment into this sector. The energy sector has also been in crisis over the past decade. It is therefore prudent that government takes the bull by the horn to deregulate power generation and distribution stages of the energy supply chain.

5.4.3 Opening Country Up for More Trade

To attain a high level of growth, it is important to open the country's market for more trade. However, a careful analysis should be done to identify sectors that warrant openness. It is also important that foreign direct investments are channeled to nascent industries instead of markets with already high levels of saturation. These scenarios of "retaliation" are associated with increased FDI where multinational firms push out domestic firms without FDI out of the market must also be corrected. There should be incentives for foreign investors who wish to invest in low growth sectors of the economy.



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Appendix

