



Ashesi University

The Effect of Foreign Direct Investment on Agricultural Growth in Ghana

By

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Supervised by Dr. Stephen Armah

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DECLARATION

I hereby declare that this thesis is my original work and that no part of it has been presented for another degree in this university or elsewhere.

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I hereby declare that the preparation and presentation of this thesis was supervised in accordance with the guidelines on supervision of theses established by Ashesi University

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Date: 27th April 2021

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ABSTRACT

This research paper investigates the effect of Foreign Direct Investment on the growth of the agricultural sector in Ghana. The literature surrounding the FDI-Growth nexus with respect to the effect of FDI on the growth of agriculture is not expansive. Agriculture employs majority of the working population and poor population in developing economies such as Ghana. Hence, the effect of any investment vehicle on such an essential sector is relevant for the formation of better-informed policies.

Variables examined in this study are Agriculture Value Added as the dependent variable and FDI inflows as the independent variable. Inflation, Gross Fixed Capital Formation, and Trade Openness served as the control variables. Data on these variables were collected from 1984 to 2019. The study applied the Autoregressive Distributed Lag (ARDL) Model to assess the nature and significance of the effect FDI has on the agricultural sector in Ghana. The various diagnostic tests when determining OLS estimates were conducted ensuring the model is robust and of good fit.

The paper finds that FDI in the long run has a negative and significant effect on the growth of the agricultural sector while inflation has a positive and significant effect. In the short run, FDI has a positive and significant association with the agricultural sector. The Government should focus on the improvement of the human capital within the sector and invest in equipment and much needed infrastructure such as roads. The laws and frameworks surrounding private business in the agricultural sector needs to be reformed and less restrictive.

Keywords: FDI, Agricultural sector, ARDL Model, Structural Break, Agricultural Value Added

LIST OF ABBREVIATIONS

ADF.....	Augmented Dickey Fuller
ARDL.....	Autoregressive Distributed Lag
FAO.....	Food and Agriculture Organization
FDI.....	Foreign Direct Investment
GFCF.....	Gross Fixed Capital Formation
GDP.....	Gross Domestic Product
GIPC.....	Ghana Investment Promotion Centre
GSS.....	Ghana Statistical Service
INF.....	Inflation
MoFA.....	Ministry of Food and Agriculture
OLS.....	Ordinary Least Squares
PP.....	Phillips-Perron
UN.....	United Nations
UNCTAD.....	United Nations Conference on Trade and Development
ZA.....	Zivot Andrews

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CHAPTER 1: INTRODUCTION

1.11 Background

A topic of debate that arises when discussing the growing relationship between developed and developing economies as trade and interdependence between them grow is the effect Foreign Direct Investment (FDI) has on the growth of the economy. This is defined as the FDI-Growth Nexus. FDI is a system of cross-border investment whereby an entity residing in a foreign economy obtains a lasting interest in an enterprise outside its home economy with the motive of managing its productive activities (OECD, 2008). An investment qualifies as FDI when the foreign investor owns 10% or more of the voting power of the enterprise.

Per the various theoretical studies conducted on this phenomenon, FDI is expected to enable economic growth by allowing the transfer of technology in the form of new capital inputs to the host countries from the foreign country (developed country), increasing capital inflows to host countries and expanding employment opportunities contributing to the development of human capital (Loungani & Razin, 2001).

FDI helps to incorporate new knowledge into the host country. This inflow of new knowledge enables domestic firms and local governments to acquire new business practices that help in the development of local businesses and industries (Markusen, 2002). The integration of FDI into the local economy from the global marketplace increases the available capital for investment to incite economic growth needed to reduce poverty and raise living standards (Dollar & Kraay, 2002). This is important because it supports the inadequate capital that domestic savings provides in emerging

economies. FDI also serves as an avenue for providing access to international trade markets for the host countries as well (OECD, 2008).

Empirically, the evidence of these spillover benefits FDI provides to host countries are still a matter of debate with various studies providing varying results. Aitken and Harrison's (1999) study on positive technology spillovers from foreign firms to domestically owned ones in Venezuela between 1979 and 1989 found no evidence of said spillovers. Carkovic and Levine (2002) found that FDI inflows do not have a positive impact on economic growth exogenously. Hence, special tax breaks put in place to attract more FDI to host countries are inefficient.

There are also studies that found the existence of the positive spillovers and impacts that justify the special policies host countries put in place to attract FDI inflows especially under certain pre-existing conditions. Borensztein, De Gregorio, and Lee (1998) as well as Alfaro (2003) found that the productivity and positive growth effect of FDI occurs when the host country has a highly educated workforce that will enable it to take advantage of the various spillovers such as technology transfers. Kokko (1994) in his study also found positive spillovers were more likely to occur in industries where there is not a large difference in technological capability coinciding with products that do not have much in common with local firms (enclave characteristics).

General acknowledgement of these spillover benefits FDI provides has led to a steady increase in FDI inflows to developing economies since 1970. FDI contributed in excess of 20 percent of GDP in developing countries such as Ghana, Brazil, and Tanzania over the 2000-2010 periods (FAO, 2012). Initially the growth-potential of FDI inflows was met with skepticism by many developing countries including Ghana. This could be attributed to the uncertainty of the virtues of FDI and historical and

political factors (Awunyo-Vitor & Sackey, 2018). Since then, Ghana and other African countries have undergone several institutional policy reforms in order to attract more FDI (Ajayi, 2006). This has been largely successful as seen in Figure 1.1

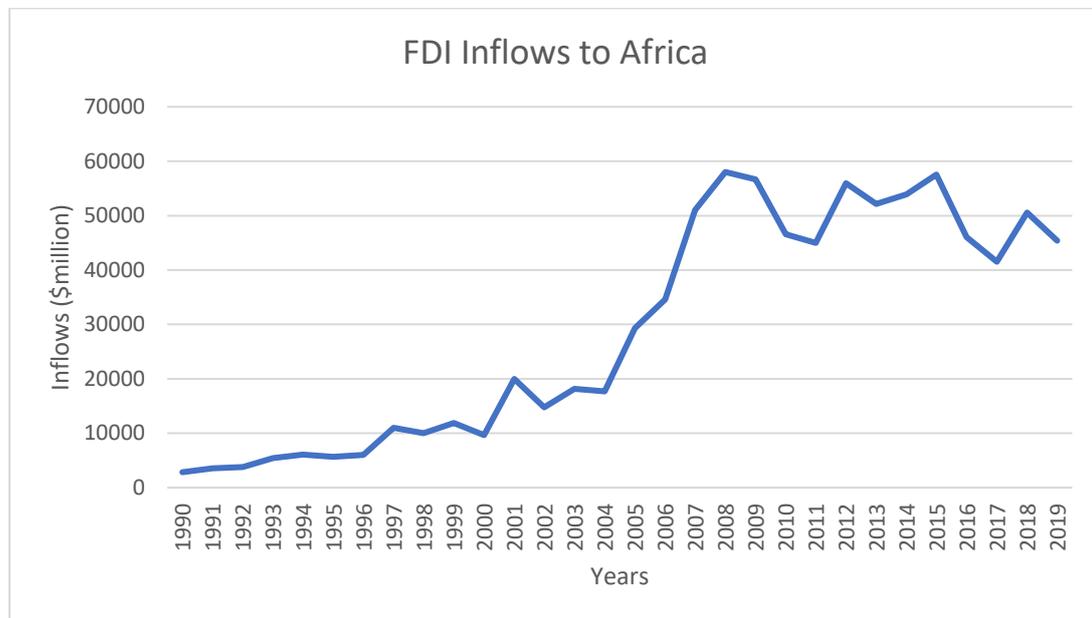


Figure 1.1 Author's computation (data from UNCTAD database website)

Figure 1.1 shows the net inflows of FDI trends in Africa. It can be concluded that for the most part policies put in place to attract FDI at the turn of the 21st century has paid off with an increase in FDI inflows to the continent from approximately \$2.8 billion in 1990 to \$4.5 billion in 2019, a 60.7% increase over 30 years. However, Africa's share in FDI net inflows to the world is still significantly low. Africa remains one of the lowest recipients of FDI globally. Currently, world FDI net inflows stands at approximately \$1.5 trillion while Africa's stands at \$4.5 billion indicating a 2.9% share in FDI net inflow to the world. As a continent, the efforts put in place to attract FDI through flexible policies are argued by some to be ineffective and needs revision (Asiedu, 2002).

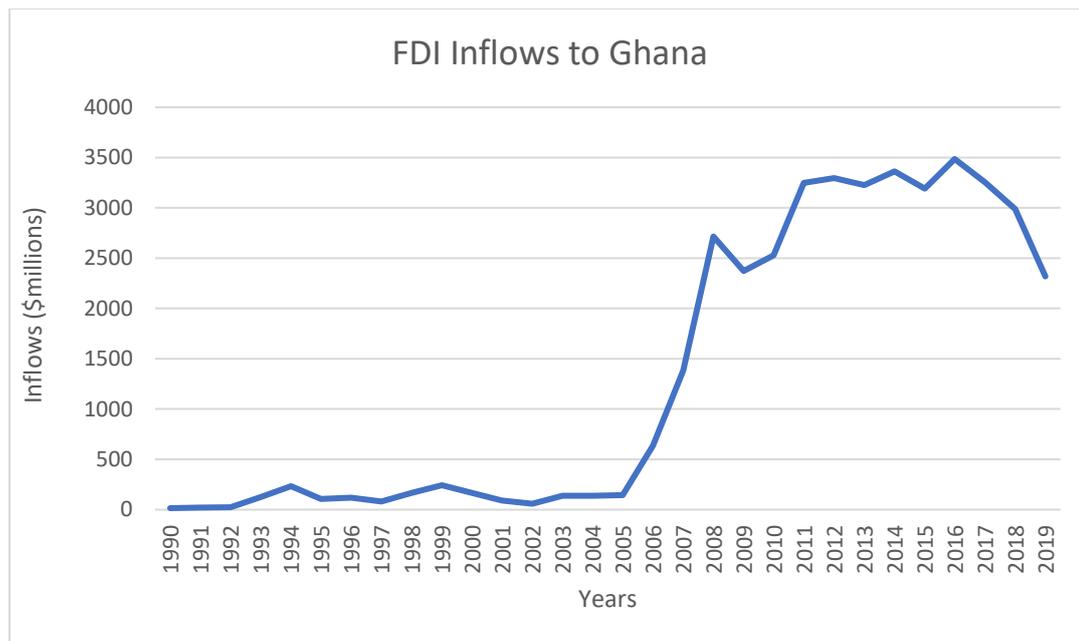


Figure 1.2. Author's own computation (data from UNCTAD's database website)

Figure 1.2 shows FDI net inflows to Ghana. For the most part, it is observed that the trend of FDI has significantly improved in spite of some fluctuations throughout the years following the establishment of the Ghana Investment Promotion Centre in 1994 and the creation of flexible policies (such as tax holidays) to spur growth in FDI inflows. FDI net inflows as at 2019 stood at \$2.318 billion dollars which is an approximate 155.6% increase in FDI net inflows from 1990. FDI has to be a positive for the Ghanaian economy with the continuous increase in FDI inflows from 1990 shown to be positively associated with GDP Per Capita. This is observed due to the high correlation existing between the two metrics seen in Figure 1.3

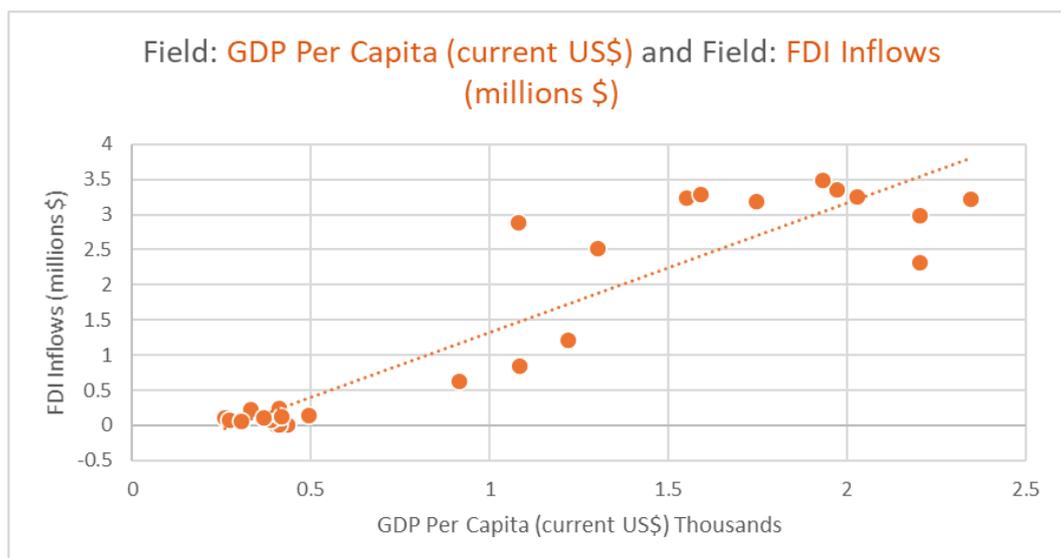


Figure 1.3. Author's Own Computations (data from UNCTAD's database website)

The inflow of FDI takes many forms. Country wise, FDI can be classified based on the main economic sectors said FDI investment is made. As such, FDI in Ghana can be classified into Agricultural sector FDI, Industry sector FDI, and Services sector FDI. Industry sector FDI relates to investments such as the setting up of Volkswagen within the automobile and vehicle assembly industry (GIPC, 2020). Service sector FDI relates to investments such as the \$1.5 billion Maersk Group committed to the expansion of the Tema port in 2016 (GIPC, 2020). Agricultural sector FDI relates to investments such as the Asutuare Sugar and Power Limited, a joint venture between international and local investors to farm and cultivate sugarcane and other crops (GIPC, 2018).

1.12 Agriculture Sector and Sectoral FDI Inflows

Agriculture is a significant component of the economy despite persistent reduction in contribution to GDP in Ghana (World Bank, 2018). Agriculture employs close to half of the working populace and is the mainstay of individuals living in rural areas (World Bank, 2018). Therefore, its importance in poverty reduction and spatial

inequality cannot be underestimated. Agriculture also contributes significantly to manufacturing in Ghana as two-thirds of Ghanaian manufacturing depended on agricultural inputs before oil production began in 2011 (World Bank, 2009). Therefore, it still remains an important factor in the competitiveness of non-oil manufacturing. Ghana is a net importer of agricultural products. Consumer ready commodities such as rice, wheat, and sugar are imported into the country (Embassy of Israel, 2020).

The Agricultural sector is broken down into five main subsectors. They are Crops, Livestock, Fisheries, Forestry, and Cocoa subsectors respectively (MOFA, n.d.).

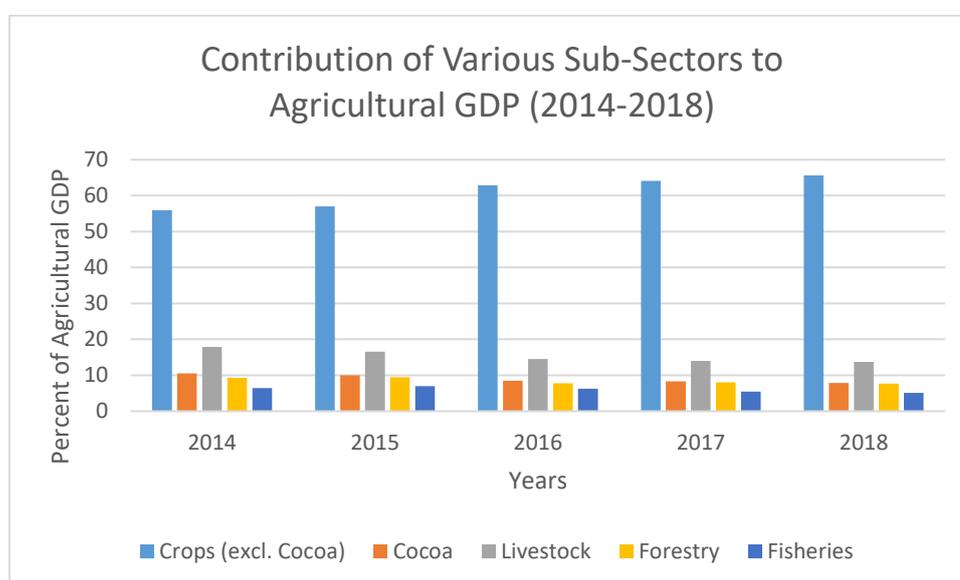


Figure 1.4. Author's own computation from GSS Database

It is observed that the crops subsector excluding cocoa still contributes above 60 percent to agricultural GDP (see Figure 1.4). The cocoa subsector contributing approximately 10 percent to total output is as a result of Ghana being one of the two largest cocoa producers in the world. Cocoa is also the most important export-revenue earning crop for Ghana with approximately \$2.2bn worth of cocoa beans and cocoa products exported in 2018 (Oxford Business Group, 2020). The output of the cocoa sector by itself is larger than what is provided by the Fisheries and Forestry subsectors.

The fisheries subsector especially has been on a decline with a decline in the stock of marine and inland fish stock. This has prompted an increase in investment in aquaculture to prevent the country from becoming a net importer of fish by 2025 (Oxford Business Group, 2020). Primary cash crops in Ghana consist of cocoa, beans, palm, oil, pineapple, cotton, tomatoes, bananas, citrus fruits, coconuts, tobacco, cashew, and fresh vegetables (GIPC, n.d.). Most of the production of these crops occur in smallholdings as this is the dominant system existing in agriculture for Ghana.

There are a slew of problems plaguing the agricultural sector of Ghana. These issues hinder the transformation of the agricultural sector and its growth (Awunyo-Vitor and Sackey, 2018). Public expenditure on the agricultural sector has been low and for the most part have declined in recent years (World Bank, 2018). Agricultural expenditure from 2001 to 2014 was 5.2 percent of total government spending (World Bank, 2018). This is significantly lower than the 10% of public spending concluded by the Malabo declaration of which Ghana is committed needed to transform and modernize agriculture. The significance of the cocoa sub sector is shown in how considerable of a share agricultural spending goes to it. According to World Bank (2018) from 2006 to 2011, the share of agricultural public spending committed to the cocoa sub sector averaged three times the subsector's share in total agricultural output (World Bank, 2013). Public spending in agriculture is for the most part spent on operating expenses. Akroyd & Smith (2007) determined that recurrent spending accounted for two-thirds of MoFA's budget. This leaves little for investment activities such as Research and Development and needed infrastructure such as road constructions to connect smallholders to the markets. This is seen in the fact that investment in irrigation development is only about 3 percent of agricultural spending. The investment gap existing in the agricultural sector can be bridged by FDI inflows

but FDI inflows to the agricultural sector is modest compared to the other sectors as seen below:

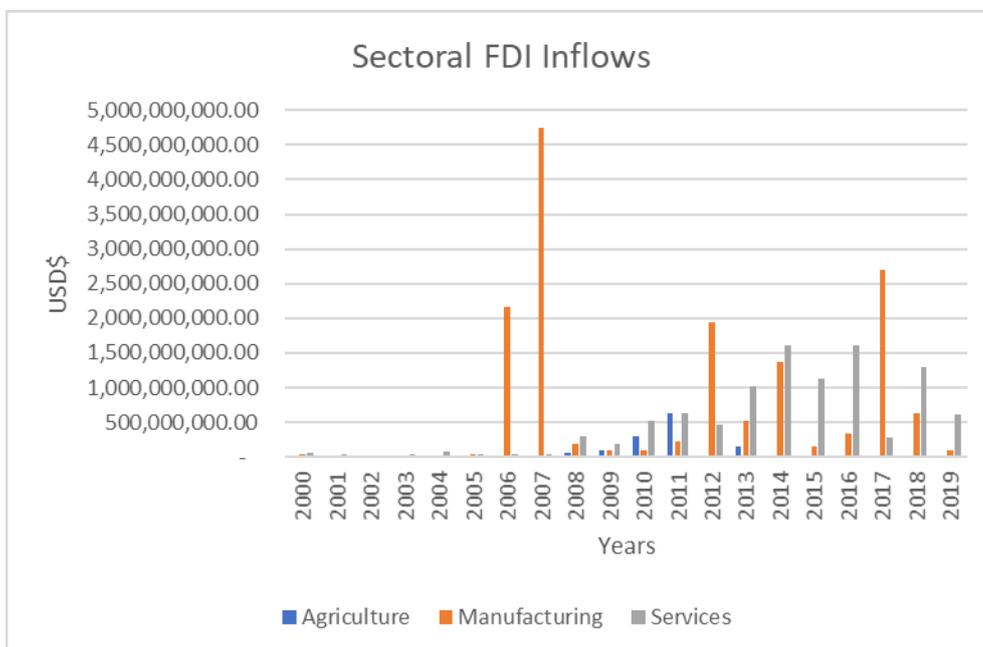


Figure 1.5. Author's estimates using data obtained from GIPC

From the above figure, Figure 1.5, agriculture has over the past two decades received significantly less FDI than the manufacturing and services sector. The growth in FDI disbursed to the manufacturing and services sector over the years whiles FDI inflows remain relatively low by a significant margin shows the inadequate private investment geared towards the agricultural sector.

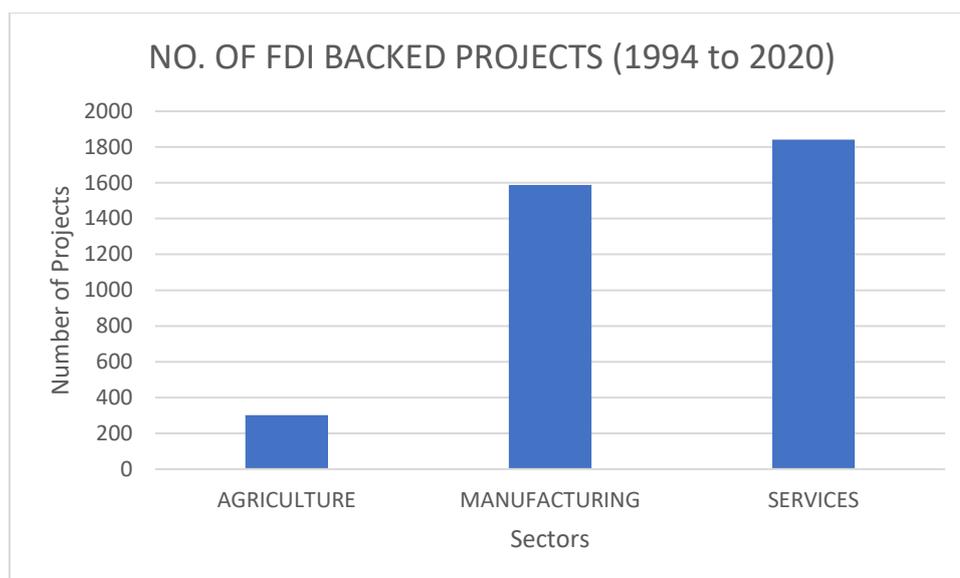


Figure 1.6. Author's estimates using data from GIPC

From the clustered column in Figure 1.6, the difference in the number of projects started in the manufacturing and service sectors as against the agricultural sector is shown. These numbers could be assumed to speak to an attempt to move the mainstay of the economy to the other sectors. However, according to the 2017 World Bank's Enabling the Business of Agriculture (EBA) report, the quality and efficiency of the regulatory and legal framework governing private investment in the agriculture sector need specialized reforms to attract more investment into the sector (as cited by World Bank, 2018). Regulations governing access to key factors required for private investment in agribusiness are still restrictive when compared to the best benchmarks (World Bank, 2012). This speaks to an institutional inadequacy resulting in the observed data. Determining the effect FDI has on the country to make clear how important reforms are needed to change this observed statistic.

1.13 Problem Statement

FDI inflows to Ghana has been steadily rising for the most part. Theoretically, FDI is supposed to spur growth within the host country through the spillover of technology, production processes and management techniques . A look at the sectoral distribution of FDI inflows, however, shows a greater distribution of FDI inflows towards the manufacturing and services sector with the agricultural sector receiving the least investment by a significant margin (see Figure 1.5). The agricultural sector has been experiencing a decline in its contribution to GDP relative to the other sectors and has also been growing at a slower rate. This has led to the creation of policy programmes put in place by government such as the “Planting for Foods and Jobs” programme (Oxford Business Group, 2020). Agriculture, however, is the mainstay of a significant percentage of the population living below the poverty line and in rural areas. It also comprises a majority of the working population (World Bank, 2018). Therefore, it stands to reason that an increase in the growth and productivity of the agriculture sector is essential in achieving sustainable growth and reducing poverty.

Research conducted on the effects of FDI across the various sectors shows that the potential to observe a spillover effect differs across the sectors. According to Hirschman (1958) not all sectors have the same absorption capacity of foreign technology or ability to create linkages with the rest of the economy, especially in the agricultural sector. This is echoed by the UNCTAD World Investment Report (2001) which argues that the primary sector has the lowest scope for linkages between foreign affiliates and local suppliers. The manufacturing and service sector are perceived to have a higher potential for spillovers. Alfaro (2003) in her study determined that FDI when distinguished among different sectors namely primary, manufacturing, and service provides little support for the positive spillovers associated with FDI in the

primary sector. However, there has also been research which speaks to the ability of FDI to drive growth in the agricultural sector. Oloyede (2014) found FDI to positively impact the growth of the agricultural sector in Nigeria using time series from 1981 and 2012.

For Ghana, the existing literature surrounding FDI, and growth have been mostly focused on its effect on the economy as a whole. Studies looking at the effect of FDI on the agricultural sector consist of Djokoto (2011), and Iddrisu, Immurana, and Halidu (2015). Djokoto (2011) analysed the granger causality between the growth in FDI and the growth in agriculture in Ghana. Iddrisu et al. (2015) using a Vector Error Correction Model (VECM) after co-integration determined FDI to have a positive impact on the agricultural sector in the short run and a negative impact in the long run using data from 1980 to 2013. However, their model failed critical diagnostic tests compromising the validity of their results. As such, there still exists the need to analyse the nature and extent to which FDI affects the growth of the agricultural sector.

Agriculture in Ghana is for the most part dominated by smallholders with low levels of productivity, insufficient access to markets and capital and a low rate of technology adoption (Pauw, 2018). This brings up the question of whether similar results supporting the theory that absorptive capabilities and positive spillovers are weak in the primary sector would be observed in the Ghanaian economy. Analyzing the effect FDI inflows have on the agricultural sector in Ghana is therefore of great importance to the government and related institutions such as the Ghana Investment Promotion Centre (GIPC) in order for them to make more informed policy decisions.

1.14 Research Objectives

The purpose of this study is broken down into objectives. These objectives are:

- 1) To study the effect FDI inflows have on the growth of the agricultural sector.
- 2) To determine if FDI is statistically significant in determining the growth of the agricultural sector in Ghana.
- 3) To determine the other factors that possibly influence growth in the agricultural sector besides FDI

1.15 Research Questions

The research questions below exist to provide a more rounded view of the relationship between FDI inflows and the growth of the agricultural sector

- 1) What is the effect of FDI on the growth of the agricultural sector in Ghana?
- 2) What other factors influence growth in the agricultural sector other than FDI?

1.16 Hypothesis of Study

Empirical research shows support for the conclusion that FDI inflows have a positive effect on growth within the agricultural sector. It is expected, per this conclusion, that FDI inflows should have a positive and significant effect on the growth of the agricultural sector.

Hence the following hypothesis was developed;

Null Hypothesis:

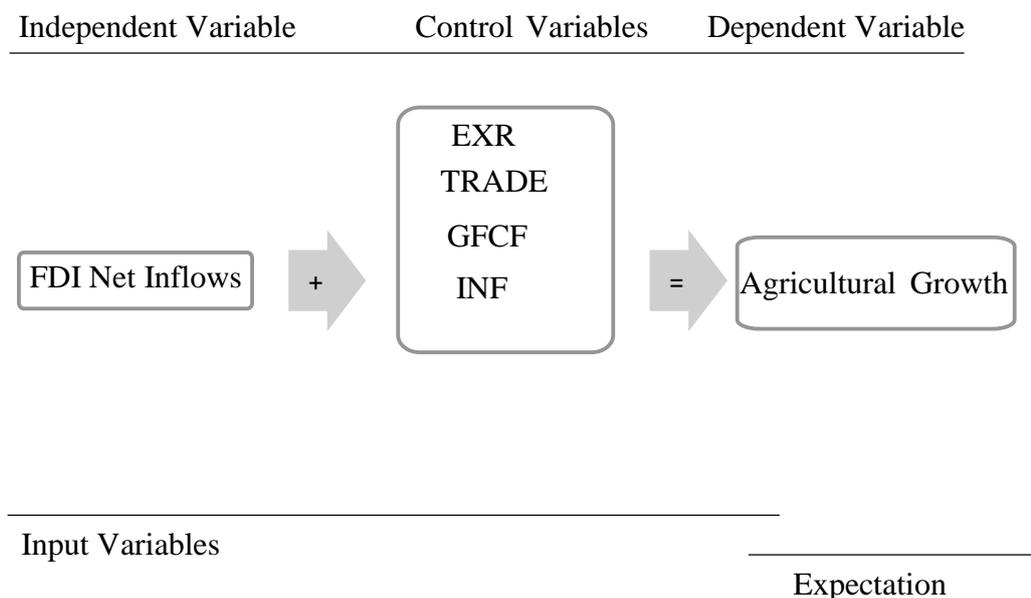
H₀: FDI inflows do not have a positive and significant effect on the growth of the agricultural sector in Ghana

Alternate Hypothesis: H₁ ≠ 0

H₁: FDI inflows has a positive and significant effect on the growth of the agricultural sector in Ghana

1.17 Conceptual Framework

The focus of this research paper is to determine whether FDI has a positive effect on the growth of the agricultural sector. Therefore, the growth of the agricultural sector and FDI exist as dependent and independent variables in the model to be used for this research respectively. According to the literature surrounding FDI and growth, there are other variables that influence the growth in the agricultural sector and the economy. These are added to the model as control variables. It is expected that FDI inflows have a positive effect on the growth of the agricultural sector. This is illustrated in the following conceptual framework drawn from Bartels-Kodwo (2016)



1.18 Methodology

This research is explanatory because it seeks to discover and analyze the effect of FDI on the growth of the agricultural sector in Ghana. The research employed the use of time series data in its analysis. To fulfill all research objectives, the research employed the use of an econometric model. The independent variable is Foreign Direct Investment Net Inflows as a percentage of GDP. The dependent variable is the Value Added by the Agricultural Sector to GDP. The control variables included in the model are: Gross Fixed Capital Formation, Trade Openness, Exchange Rate, and Inflation. Data used are quantitative in nature and sourced from secondary sources only. Data gathered are used for the measurement of the independent, dependent or control variables and were obtained from the World Bank World Development Indicators, and UNCTAD.

1.19 Scope of Research

The scope of the research is formed around financial data including FDI inflows, Value Added by Agricultural Sector to GDP, Gross Domestic Product, Inflation, Trade Openness, Exchange Rate, Gross Fixed Capital Formation, and Labour. Data collected was on a yearly basis from 1990 to 2018. All data used are secondary data.

1.2 Research Relevance

The Agricultural sector employs close to 50% of the entire population and yet it continues to experience a decline in its contribution to the economic growth of Ghana as well as a lower growth rate compared to the other sectors. The development of the

agricultural sector in Ghana is recognized as being essential to achieving sustainable growth and reducing poverty. This is seen through the prioritization of modernizing the agricultural sector by the government in the 2019 budget (Ministry of Finance, 2018). And before that Ghana's decision to enter into the CAADP agreement of the Malabo Declaration on Agriculture transformation to ensure that the growth of the agricultural sector surpasses 6% yearly (AUDA-NEPAD, n.d.). A target which the country for the most part has failed to surpass.

Foreign Direct Investment as a driver of growth within the primary sector is a topic of debate with no clear conclusion yet. This research contributes to the body of knowledge by filling in a gap on the actual effect of FDI on the agricultural sector and whether it is a significant determinant of growth.

The results of this research will be of significant help to the government by helping them assess the inadequate or the valid current FDI inflows to the agricultural sector creating possible policy changes if need be.

1.21 Outline of Dissertation

This paper is organized into five chapters. The first provides a background to the study and reasons for the study. The second chapter reviews literature on the topic in focus and the third chapter presents the methodology and data sources of the research analysis. Chapter four presents the results of the analysis and its interpretations. The final chapter, Chapter five concludes on the findings of the study and provides recommendations informed by said findings.

CHAPTER 2: LITERATURE REVIEW

2.11 Introduction

This chapter explains the fundamental existing knowledge about the relationship between foreign direct investment and growth by analyzing and critiquing previous research done on the research topic. The literature review provides information about empirical research and their varying conclusions on the relationship between FDI and growth from a global, Sub Saharan Africa, and Ghanaian standpoint. Studies that have influenced the scope in which this relationship is analyzed by considering the importance of sectors hence providing the framework for this research are included as well.

In this chapter, five key areas will be assessed; (a) General empirical review of FDI on economic growth, (b) Empirical and theoretical studies that concluded a positive impact of FDI on economic growth both in the world and Africa, (c) Empirical and theoretical studies that found a negative or ambiguous effect of FDI on economic growth both in the world and Africa, (d) Studies focused on the sectoral impact of FDI on economic growth, and (e) Studies focusing on the impact of FDI on agriculture

2.12 General empirical review of FDI on economic growth

The theoretical and empirical principles of the FDI-growth nexus are grouped into three categories. These are the positive view, the negative view, and the dependent impact view. The positive view operates according to neo-classical growth theory. FDI is perceived to affect income growth by increasing the amount of capital per person. Long run growth is spurred through variables such as Research and Development and

human capital. This is done through technology transfer to their affiliates and technological spillovers to unaffiliated firms in the host economy (Romer, 1994).

The dependent impact view posits that FDI does not independently impact growth hence the benefits the host country gains from FDI depends on its ability to absorb those benefits. Borensztein et al. (1998) using an endogenous growth model determined that FDI increases economic growth through technological spillovers from the developed country to the host country. FDI was also found to have a larger effect on growth than domestic investment. They also determined FDI to have a crowd in effect on domestic investment. However, the magnitude to which these conclusions hold according to their study depends on the level of human capital in the country. Blomstrom, Lipsey, and Zejan (1994) also posited that FDI's positive impact on growth can only be observed when the host country is wealthy and developed beyond a certain threshold. Balasubramanyam, Salisu, and Spasford (1996) found that FDI is associated with faster growth in developing host countries when they pursue outward-oriented trade policies. Therefore, the impact of FDI on growth and the enhancement of domestic investments depends on the host country's trade openness.

The negative view perceives FDI to have a negative impact on the growth of host countries as well as increasing income inequality. Research by Kentor (1998) concluded with results polar opposite to that determined by Borensztein et al. (1998). In his research Kentor (1998) found out that countries highly dependent on foreign investment grow at a slower rate than countries less dependent on it. Therefore, FDI does not lead to more growth than domestic investment as posited by Borensztein et al. (1998).

The directional causality of FDI and growth is also another issue that has varying results in the empirical literature. Karikari (1992) found that increase in economic output significantly causes Foreign Direct Investment. He concluded this using data for Ghana from 1961 to 1988 and conducting a Granger causality test. Hansen and Rand (2006) in their research found causality between FDI and economic growth to be bi-directional. Ugwuegbe, Okore, & Onoh (2013) found a unidirectional causality from GDP (proxy for economic growth) and FDI indicating that it is the growth of the domestic economy that attracts an increase in FDI inflows to the host country.

2.13 Empirical and Theoretical Studies That Concluded A Positive Impact of FDI on Economic Growth Both in The World and Africa

Li & Liu (2005) found a positive impact of FDI on economic growth using data on 21 developed countries and 63 developing countries from 1970-1999. Data was analyzed using a random effects model and 3 Stage Least Squares (3SLS). The results of the study highlighted the significance of the availability of human capital to observe this positive relationship. Ugwuegbe, Okore, & Onoh (2013) found a positive impact of foreign direct investment on economic growth. They used the Ordinary Least Squares (OLS) regression model on data specific to Nigeria from 1981 to 2009. The effect of FDI though positive was insignificant. Sokang (2018) used a correlation matrix and multiple regression analysis to determine the impact of FDI on economic growth in Cambodia from 2006 to 2016. These results also showed a positive impact of foreign direct investment on economic growth. Menamo (2014) conducted a study on the impact of foreign direct investment on economic growth in Ethiopia using time series

data from 1974 to 2001. A positive and significant impact of FDI on economic growth in Ethiopia was concluded using the Ordinary Least Squares Method.

Gao (2004) found a positive relationship between FDI and Income using OLS estimates as well as the addition of an instrumental variable (IV) to counter the effects of endogeneity in the OLS model. The IV estimates were also positive and robust leading to the conclusion of FDI being beneficial to the host country. Data analyzed was FDI from OECD countries to about 60 host countries from 1980 to 1990. Sakyi (2011) found a long-term relationship between economic growth, openness of trade and foreign aid using data from 1984 and 2007 analyzed using autoregressive distributed lag (ARDL) bounds test. Insah (2013) found a positive relationship between FDI and economic growth in Ghana using time series data from 1980-2010 and lagged FDI values.

2.14 Empirical and Theoretical Studies That Found A Negative or Ambiguous Effect of FDI on Economic Growth

Rahman (2015) conducted a study on the impact of foreign direct investment on selected macro-economic variables. Using multiple regression on time series data from 1999 to 2013, he found a negative correlation between FDI and economic growth. In support of Borensztein et al (1998) he further suggested that FDI led growth is dependent on the level of human capital. Carbonell and Werner (2018) conducted a study on whether foreign direct investment enhances growth using data from 1984 to 2010. The focus of the study was Spain, a country that is among the highest recipients of foreign direct investment, has an above average GDP level and has been experiencing unusually high growth. Spain was chosen to test the hypothesis that the

absorptive capacity of countries enables them to enjoy the spillover benefits associated with FDI. Since Spain is a developed country, it can be perceived that their ability to absorb would be greater than that of developing countries hence the effects of FDI stand a higher chance of being observed. Using a GETS methodology, the results of the research found no evidence of foreign direct investment having a positive impact on economic growth in Spain.

The effects of FDI on economic growth has been found to ambiguous in some studies. Carkovic and Levine (2002) used simple Ordinary Least Squares Regressions and a dynamic panel procedure for data on 72 countries over the period 1960-95. The results of their study concluded that FDI does not independently exert a positive impact on growth. Hence, its effects are ambiguous although sound economic policies may spur an increase in FDI and growth.

2.15 Studies Focused on The Sectoral Impact of FDI on Economic Growth

Literature concerning the sectoral impact of heterogeneous FDI is a relatively recent addition to the literature on FDI and growth. It is important because the different absorptive capabilities of the different sectors means that they exert varying impacts on economic growth (Jana, Sahu, & Pandey, 2019). Notable research for this dynamic was carried out by Alfaro (2003) who studied the effect of FDI on economic growth by focusing on the effect of heterogeneous FDI inflows on the various individual sectors of developing countries. Cross country data covering 47 developing countries spanning from 1981 to 1999. Alfaro found that FDI in the primary sector had a negative effect on growth. FDI in the manufacturing sector had a positive and significant effect on economic growth whiles FDI in services had an ambiguous effect on growth.

Aykut and Sayek (2007) in light of similar research conducted by Alfaro (2003) attempted to determine the contribution of the sectoral composition of FDI to the economic growth of the host country. This was also a cross country study using a data set of 33 countries. The research study concluded a significant and positive effect of FDI on economic growth when it is focused on the manufacturing sector echoing theoretical work by Wang and Blomstrom (1992) who relate the spillover benefits of FDI to the manufacturing or service sectors. FDI in primary and service sectors has an adverse impact on economic growth according to the results of the study and as such they recommended that countries reassess policies on FDI to maximise benefits by altering the composition of FDI inflows. Wang (2009) also supported these findings in a study based on a sample of 12 Asian economies from 1987 to 1997. The study observed that manufacturing FDI on economic growth has a positive and significant effect while non-manufacturing FDI does not provide evidence that speaks to the same positive impact. Landry Chabe (2015) conducted a study on the impact of FDI on economic growth in Cameroon using a regression analysis on time series data from 1977 to 2010. He found that FDI in the primary sector had a positive effect on economic growth while FDI in both manufacturing and service sector had a negative impact on economic growth.

2.16 Studies Focusing on The Effect of FDI on Agriculture

FDI is perceived to have an impact on agriculture by bridging the investment gap in the agricultural sector of developing countries. Studies focusing on FDI and its effect on agriculture however result in a positive or negative impact of FDI on the development of the agricultural sector in the host country depending on the study in

question. The results observed are country specific and vary from study to study. Oloyede (2014) for instance studied the impact of FDI on the growth of the Agricultural sector in Nigeria using time series from 1981 and 2012 employing the OLS regression method. He found FDI to positively impact agriculture. FDI according to Oleyede (2014) stimulates diversification in domestic income which boosts the agricultural sector. Political stability however would negatively affect FDI in the agricultural sector in the long run. Msuya (2007) studied the impact of FDI on productivity within the agricultural sector and poverty reduction in Tanzania through a review of existing literature. He concluded per his observations that growth in the agricultural sector was positively impacted by FDI. FAO (2014) also states that FDI has the potential to generate various benefits for the agricultural sector of the host country. This includes an increase in employment, transfer of technology and better access to capital and markets. FDI in agriculture impacts the agriculture sector in the host country positively by pushing investment in areas such as irrigation and infrastructure (FAO, 2014). These are areas that are barely given significant allocation in the budget of Ghana hence FDI can bridge that gap by providing said investment.

Speaking to the varying schools of thought on the relationship between FDI and agriculture, research studies have also determined a negative or insignificant relationship between FDI and productivity in the agricultural sector. . Epaphra & Mwakalasya (2017) conducted a study on the impact of FDI on growth in the agricultural sector with agricultural value added as a proxy for growth using data from 1990 to 2015. Data was analysed using Johansen's cointegration method and they concluded that there is no effect of FDI on agricultural value added. Djokoto (2011) studied the causal link between the growth of FDI inflows to agriculture and the growth in agricultural productivity for Ghana by performing a granger causality test using data

from 1966 and 2008. The author found no causal link between the variables. From the Ghanaian context, research specifically FDI on the performance of the agricultural sector to the best of my knowledge has only been undertaken by Iddrisu, Immurana, and Halidu (2015). Using data over the period of 1980-2013 which was analyzed with the Johansen cointegration test, they found that FDI negatively impacts agricultural sector productivity in the long run but observed a positive relationship in the short run. Trade openness was determined to significantly impact the agricultural sector in the long run and the depreciation of the cedi as expected negatively impacted growth of the agricultural sector. However, the validity of their results are compromised based on the serial correlation observed in the model through their diagnostic tests. This is because serial correlation leads to the conclusion that OLS estimated standard errors are smaller than they actually are. Parameter estimates are therefore concluded to be more accurate than they are leading to unreliable hypothesis testing.

2.17 Conclusion

The literature reviewed speaks to the inconclusiveness of whether FDI impacts growth in the agricultural sector or not. There is the need for further research into this dynamic to add to the existing literature to come to a more conclusive decision on the subject matter. The difference in the absorptive capabilities of countries also brings the need to study this phenomenon from a country specific perspective. In the Ghanaian context, only one research study conducted by Iddrisu et al (2015) to the best of my knowledge has addressed this gap in the literature. However, their model was serially correlated. Therefore, through the use of more recent data and a more robust model

meeting all diagnostic checks, this research paper contributes to filling the existing gap in the general FDI-growth literature as well as the country specific growth literature.

CHAPTER 3: METHODOLOGY

3.11 Introduction

The focus of this research study is to examine the effect of FDI on the growth of the agricultural sector in Ghana. The little existing literature concerning this phenomenon is controversial with no clear consensus and due to the nuanced nature of FDI and its effect on individual countries, it cannot be concluded that observed results from these studies are directly applicable to Ghana hence there is a need to undertake this research. This chapter presents the methods used to collect and analyze data for this research as well as the accompanying limitations. A clear outline of the methodology is relevant due to the replicability requirement of quantitative research which would be made possible in this chapter.

3.12 Research Design

This research can be identified as a quantitative research because it employs the use of mathematical, computational techniques, and statistical data to determine the effect Foreign Direct Investment has on the growth of the agriculture sector. In determining the relationship between the two variables in question that is a) Growth in the agriculture sector and b) Foreign Direct Investment a regression model would be used similar to research undertaken by Epaphra and Mwakalasya (2017) and Iddrisu et al. (2015).

3.13 Data and Data Sources

The data used for this research consists wholly of secondary time series data obtained from secondary sources. The data was collected on an annual basis from the period 1984 to 2019. This range of data was used to allow for more recent analysis of the phenomenon. The length of the data used was determined by the availability of all the variables needed for the research study. Data collected was extracted from the UNCTAD World Investment Directory and World Bank Development Indicator databases. The data include the following:

1. Agriculture Value Added;
2. FDI Net Inflows;
3. Gross Fixed Capital Formation;
4. Inflation;
5. Trade Openness;
6. Exchange Rate;

There are six variables in total being analysed. The dependent variable is the Value Added by Agriculture (as a percentage of GDP) and the independent variable is the Net FDI Inflows to Ghana (as a percentage of GDP). The rest of the variables serve as control variables for the model used in the analysis of the data.

3.14 Method of Analysis

Within the FDI-growth nexus literature there have been various methods used to analyse and estimate the coefficients for the variables involved. Cross country regression analysis has been used by Alfaro (2003) to analyse data on the effect of

sectoral Foreign Direct Investment on economic growth from various countries. Awunyo-Vitor and Sackey (2018) used the Granger Causality test on time series econometric data to determine the relationship between agriculture sector foreign direct investment and economic growth in Ghana.

This research study analysed the data in focus using multiple regression in the Cobb-Douglas log linear form. This is the application of a log transformation which is multiplicative in nature to the general form of the model to make it linear for data analysis. This is similar to the models used by the works of researchers such as Iddrisu, Immurana, and Halidu (2015) and Epaphra and Mwakalasya (2017).

3.15 Data Analysis

The Autoregressive Distributed Lag Model (ARDL) Regression method was used in the OLS estimation of the parameters for the variables involved. The ARDL model was employed due to the mix of I(0) and I(1) variables observed in the model. The use of the ARDL model is valid under certain classical modelling assumptions which the research satisfied:

1. Linearity in Parameters: The model in the population can be written as:

$$Y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_k x_k + u_i$$

Where 0, 1, ..., k are the unknown parameters (constants) of interest and u_i is an unobservable random error or disturbance term.

2. Random Sampling: The sample is a random one of n observations $\{(x_{i1}, x_{i2}, \dots, x_{ik}, y_i): i = 1, 2, \dots, n\}$ which follows the population model in assumption 1 above.

3. No Perfect Collinearity: None of the independent variables should be constant and there should be no perfect linear relationships among the independent variables.

4. Zero Conditional Mean: The error term (u) has an expected value of zero given any value of the independent variables in the model Such that: $E(u|x_1, x_2, \dots x_k) = 0$

5. Homoskedasticity: The error term (u) has the same variance given any values of the explanatory variables. Such that: $Var(u|x_1, x_2, \dots x_k) = \sigma^2$

The OLS estimator is the most efficient unbiased estimator for the models' coefficients when the above assumptions are met and has been used by researchers such as Oloyede (2014) to study the impact of FDI on the growth of the agricultural sector in Nigeria. In order to generate the OLS estimates for the long and short run relationship between the variables, the ARDL bounds test and ARDL model was used.

3.16 The Model

The research is tasked with fulfilling the objectives of determining the effect of FDI on agriculture. Therefore, a model consisting of factors determined to be essential to agricultural and economic growth by theoretical and empirical studies around the FDI-growth nexus literature besides FDI was generated. That is gross fixed capital formation, trade openness, exchange rate, and inflation. The model used and the expected signs of the coefficients of the regressors are as shown below:

$$AGR_t = f\left(\left(\begin{matrix} FDI_t \\ (+or-) \end{matrix}\right), \left(\begin{matrix} INF_t \\ (-) \end{matrix}\right), \left(\begin{matrix} GFCF_t \\ (+) \end{matrix}\right), \left(\begin{matrix} REXR_t \\ (+or-) \end{matrix}\right), \left(\begin{matrix} Trade_t \\ (+) \end{matrix}\right)\right) \quad (1)$$

Where:

FDI- Foreign Direct Investment Net Inflows (percentage of GDP)

AGR- Agriculture value added (percentage of GDP)

INF- Inflation Rate (CPI annual percentage)

GFCF- Gross Fixed Capital Formation (percentage of GDP)

REXR- Real Exchange Rate

Trade- Trade openness measured as the sum of imports and exports (percentage of GDP)

Using the Cobb-Douglas log linear form to make the above equation linear so as to directly obtain agricultural growths responses to the regressors, the regression models take the forms:

$$\ln AGR_t = \beta_0 + \beta_1 \ln FDI_t + \beta_2 \ln INF_t + \beta_3 \ln GFCF_t + \beta_4 \ln REXR_t + \beta_5 \ln Trade_t + \varepsilon_t \quad (2)$$

Where

$\beta_0, \beta_1, \dots, \beta_7$ = coefficients of variables to be estimated

t = the period of time, years

ε_t = the error term

3.17 Definition of Selected Variables

The model seeks to establish the effect FDI has on the growth of the agricultural sector. The main variables used in constructing the model are Agriculture Value Added (as a percentage of GDP), FDI Net Inflows (as a percentage of GDP), and control variables informed by the literature.

The description of these variables as well as their justification are as shown below:

FOREIGN DIRECT INVESTMENT

Foreign Direct Investment is used to obtain a controlling interest in a business entity operating outside the home country of the investor. FDI is perceived to complement domestic investment which is inadequate to spur economic growth in the host country. FDI inflow increases would increase the productivity of the agricultural sector and as an extension GDP growth through the transfer of technological spill over benefits and other benefits such as managerial and organizational processes (Loungani & Razin, 2001). However, there is also literature that speaks on the hypothesis that FDI inflows does not have the perceived spillover benefit that is characteristic of it in the primary sector. Alfaro (2003), Wang and Blomstrom (1999), UNCTAD (2001) all posit that FDI tends to have a negative effect on the performance of the primary sector due to the poor absorptive capacity of firms existing within that sector. Coefficient of that regressor is therefore assumed to be either positive or negative.

AGRICULTURE VALUE ADDED

This is the contribution the output of the agricultural sector makes to the GDP of the economy. According to Singaariya & Sinha (2015), an increase in real GDP leads to a reduction in the share of agriculture expenditure in total expenditure (as cited by Epaphra and Mwakalasya, 2017). Therefore, it can be implied that there is a negative correlation between per capita GDP and the value-added share of agriculture in GDP (Epaphra and Mwakalasya, 2017). This is observed in Ghana as GDP growth in recent years has occurred alongside a decline in agricultures contribution to GDP. Singaariya & Sinha (2015) find that the sign of the estimated coefficient for the agricultural sector

regressor is negative. This forms the estimation of the coefficient of the agriculture value added regressor to be negative in the model.

GROSS FIXED CAPITAL FORMATION

This is the stock of machinery, plant, equipment, purchases, and infrastructure such as industrial buildings, railways, and roads. Capital is required to build infrastructure as well as undertake research and development. These are all issues facing the agricultural sector in Ghana. It is therefore expected that an increase in gross fixed capital formation would positively impact growth in the agricultural sector and the economy by extension.

TRADE

This is the sum of export and import statistics taken as a percentage of GDP. Trade openness allows firms to access cheaper and more efficient technology and pick up better managerial skills from more developed economies abroad (Miller & Upadhyay, 2000). Trade liberalization promotes productivity in the agricultural sector by taking advantage of comparative advantages that arise from foreign competition, access to economies of scale and better technological development (De Silva, Malaga, & Johnson (2013) and Jayanthakumaran, K. (2002)). Degree of openness in growth literature has been determined to exert a positive influence on economic growth through research such as Dollar and Kraay (2002), and Frankel and Romer (1999). This is why the estimated sign of the coefficient for this variable is positive.

EXCHANGE RATE

The exchange rate for this variable is between the Ghanaian cedi and the United States dollar. This exchange rate was chosen by virtue of the United States dollar being the most actively traded foreign currency in Ghana. Exchange rate is a key player in

international trade and economics. An increase in exchange rate may lead to an increase in the demand for domestic products as well as the cost of imported capital and other imported (Epaphra and Mwakalasya, 2017). Therefore, exchange rate can either have a positive or negative effect on the model based on the data observed hence the positive or negative sign for the estimated coefficient of the exchange rate regressor. In this model, exchange rate is proxied by the real exchange rate. This is done in order to remove the distortion effect of Inflation.

INFLATION

This is the persistent rise in the price of products and services over a specified period (Mankiw, 2016). This is an indicator of macroeconomic stability or instability. Inflation as determined by the Consumer Price Index (CPI) is used in this research study. In cases of high inflation, investment and growth would suffer as consumers ability to purchase domestic products would decrease effectively reducing funds for savings hence investment. Therefore, an increase inflation would lead to a fall in the growth of the economy and the agricultural sector. In light of this a negative sign is assumed for the estimated coefficient of the inflation regressor.

3.18 Ethical Considerations

Seeing as the data used in this paper was purely of a secondary quantitative variant there are few ethical issues to solve. However existing ethical considerations include reporting results that favour the objective of the research regardless through the editing and fabricating of data. Also, the use of inappropriate statistical tests on the data is an ethical consideration since it automatically results in a conclusion that is not observed and cannot be inferred to the general population.

In order to undertake this research with said ethical considerations in mind, the data used in this research is unedited. This can be verified from the cited sources of the data which are all internationally recognized databases. The outputs of the regressions and the various tests conducted was included in the research paper and its appendix.

3.19 Limitations and Delimitations

Limitations affecting this study include data constraints as some variables did not have data available for some years. This resulted in the use of 36 observations in the study and may compromise the significance of the results obtained. Another limitation is the relationship between FDI and the agricultural sector may not be explained by the linearity assumed with respect to OLS estimation.

A delimitation is the use of diagnostic checks postestimation to ensure results are accurate and robust.

CHAPTER 4: FINDINGS AND RESULTS

4.11 Introduction

This chapter examines the effect of FDI on the growth of the agricultural sector in Ghana. Data on the variables in question concerning these two relationship dynamics span from 1984 to 2019. Descriptive statistics on the data are generated and analyzed to provide a clearer understanding of the data during the years under study. Autoregressive Distributed Lag Modelling (ARDL) was conducted to determine the association and effect FDI has on the agricultural sector. The tool of analysis was STATA.

4.12 Summary of Time Series Data

Table 1.1

Results of Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
Value Added by Agriculture	36	34.20278	10.17126	17.31	50.6
FDI Inflows	36	3.339722	2.962355	0.05	9.47
Inflation	36	20.76417	12.26932	7.13	59.46
Gross Fixed Capital Formation	36	19.20361	6.371163	6.85	29.25
Real Exchange Rate	36	136.7325	95.77847	64.63	557.55
Trade Openness	36	68.62889	23.1921	18.81	116.05

Source: Author's Estimates

The above table shows the results of the summary statistics of the variables used in this research study. The proxy for Agriculture's value, Value Added by Agriculture (as a percentage of GDP) had a mean of 34.2 percent. This speaks to the steep fall Agriculture has experienced from a contributor of more than half of Ghana's GDP at the beginning of the period under study to being the least contributor to GDP. FDI

inflows (as a percentage of GDP) had a mean of 3.33 percent for the period in question. Inflation had a mean of 20.7 percent over the 36 years under review. The economic crisis of the 1980s and 1990s is a significant contributor to the high average observed here as inflation was at unprecedented levels over that period. Gross Fixed Capital Formation had a mean of 19.2%, Trade Openness averaged 68.62 percent of GDP over the period and Real Effective Exchange Rate had an average of 136.73.

The count for all variables was 36 recorded on a yearly basis for a period of 36 years as well from 1984 to 2019.

4.13 Multicollinearity Test

According to Wooldridge (2015), the condition of multicollinearity is one of the Gauss Markov and Classical Linear Assumptions that must be met in order to produce accurate and unbiased regression results. It posits that a highly correlated linear relationship between the independent variables produces biased regression results. A correlation matrix and Variance Inflation Factor were generated with regards to the model to prove that the variables are not highly correlated with each other.

Table 1.2

Correlation Matrix of Independent Variables

	fdi	inflation	gfcf	rexr	trade
fdi	1				
inflation	-0.4796	1			
gfcf	0.1818	-0.1174	1		
rexr	-0.51	0.2926	-0.6218	1	
trade	0.3435	-0.2379	0.6322	-0.6656	1

Source: Author's Estimates

Per Table 1.2, the correlation between the independent variables ranges from low to medium correlation between the variables showing that the variables are not highly correlated with each other.

The conduction of a Variance Inflation Factor Test (VIF) is done to analyze the multicollinearity of an independent variable as against every other independent variable. A VIF of 1 means the variable in question is not correlated with the other independent variables. A VIF between 1 and 5 implies moderate correlation and a VIF greater than 5 would imply high levels of correlation violating the condition of multicollinearity.

Table 1.3

Variance Inflation Factor

Variable	VIF
LNREXR	5.76
LNFDI	4.16
LNTRADE	3.31
LNGFCF	2.81
LNINFLATION	1.45

Source: Author's Estimates

Table 1.3 above shows that Real Effective Exchange Rate has a VIF higher than 5. Hence it is dropped from the model for result robustness.

4.14 Test for Stationarity

The use of time series in econometric analysis requires that the stationarity properties of the variables in question are tested. The Augmented Dickey-Fuller (ADF),

Phillip-Perron (PP), and Zivot and Andrews (ZA) tests are employed to test for unit roots in this research study.

Table 1.4

Results from the ADF Test for Unit Root

Variables	Log Levels		First Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
LNAGRIC	0.212	-3.121	-5.677**	-5.771**
LNFDI	-1.724	-2.072	-4.612**	-4.907**
LNINFLATION	-2.370	-4.642**	-5.128**	-5.077**
LNGFCF	-2.461	-2.296	-4.292**	-4.436**
LNTRADE	-3.165*	-2.603	-5.570**	-6.006**

Source: Author's Estimates

* indicates 5 percent significance

** indicates 1 percent significance

Per the results in Table 1.4, all the variables are nonstationary at level. However, at first difference, all variables are stationary at both constant and constant and trend implying the variables are integrated of the order one I(1).

The ADF approach is however assumed to have inherent homoscedastic errors hence the Phillips-Perron test is used in conjunction with the ADF test to supplement its weaknesses. The results of the Phillips-Perron test are as follows

Table 1.5

Results from the Phillips-Perron Unit Root Test

Variables	Log Levels		First Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
LNAGRIC	0.108	-2.378	-5.066**	-5.179**
LNFDI	-2.194	-2.301	-5.613**	-5.627**
LNINFLATION	-3.282**	-4.378**	-7.486**	-7.478**
LNGFCF	-2.95	-2.651	-5.856**	-5.900**
LNTRADE	-3.623**	-2.747	-5.014**	-5.365**

Source: Author's Estimates

* indicates a 5% significance

** indicates a 1% significance

The results observed in Table 1.4 and Table 1.5 respectively shows the outcome of both the Phillips Perron test and ADF test determine that inflation is stationary at levels with the other variables stationary at both constant and constant and trend at first difference. Therefore, inflation is integrated of order zero $I(0)$ with the other variables integrated of order one $I(1)$.

However, the results of the above ADF and PP unit root tests may be called into question when the data sample under review incorporates economic events capable of causing regime shifts (Lee and Chang, 2005). The plot of the series suggests that the data might have structural breaks which would affect the stability of the series and as such the robustness of the model and results (Appendix) To address this, the Zivot and Andrews (1992) unit root test which endogenously corrects for one structural break in the series is applied. The results are as follows

Table 1.6

Results of the Zivot and Andrews (ZA) Unit Root Test

Variables	Log Levels		First Difference	
	Year	Critical Value	Year	Critical Value
LNAGRIC	2006	-3.438	2006	-6.581**
LNFDI	1994	-3.375	2006	-6.004**
LNINFLATION	1997	-4.663*	-	-
LNGFCF	1994	-3.066	2012	-6.597**
LNTRADE	2001	-3.939	2001	-6.568**

Source: Author's Estimates

* indicates 5% significance

** indicates 1% significance

Table 1.6 shows inflation again exhibits stationarity properties at levels with the other variables exhibiting stationarity at first difference. Agriculture Value Added (as a percentage of GDP) is shown to be stationary at a possible break in the data set. The results shows that the structural change in Agriculture Value Added occurred in 2006. This was when the national accounts of the country was rebased to account for service contributions to GDP that were previously unaccounted for (Diao, Hazell, Kolavalli, & Resnick, 2019, p.22). As such, services share of GDP experienced a jump from approximately 30 percent of GDP to almost 50 percent with agriculture experiencing a fall from approximately 40 percent of GDP to 30 percent (Diao et al., 2019). For FDI, a unit root was determined at its structural change occurring in 1994 at levels.

This structural change is observed due to the rapid peak in FDI inflows of \$233 million reflecting the partial sale of the Ashanti Goldfields Corporation (AGC) to South African mining company, Lonmin (UNCTAD, 2003, p.4). The enactment of the Investment Code in 1994 also put the country at the front of foreign investment destinations in Africa (UNCTAD, 2003, p.4) The structural break observed in 1997 for inflation at levels is as a result of a fiscal adjustment plan launched by the government

to restore budgetary discipline, reduce public borrowing, and lower inflation and interest rates (IMF, n.d.). Gross Fixed Capital Formation exhibited stationarity properties at first difference with structural change occurring in 2012. There was a concerted effort by government to attract and undertake more infrastructural development with \$3 billion borrowed from the Chinese Development Bank to facilitate this (Ministry of Finance, 2011).

4.15 Testing for Cointegration

Cointegration test determines whether the variables in question have a long run relationship or converge at the equilibrium. Looking at the nature of the variables under review, (a mix of I(0) and I(1) variables) the ARDL model and the ARDL bounds test approach to cointegration is used to estimate the effect of FDI on the agricultural sector of Ghana. However, the confirmation of structural breaks cannot be ignored. As such, dummy variables are introduced into the ARDL model to represent the break points in the series. Therefore, the estimated ARDL model representation takes the following form:

$$\begin{aligned} \Delta \ln AGRIC = & \alpha + \sum_{j=1}^p \phi_j \Delta \ln AGRIC_{t-j} + \sum_{j=0}^{q1} \phi_j \Delta \ln FDI_{t-j} + \\ & \sum_{k=0}^{q2} \phi_k \Delta \ln INF_{t-k} + \sum_{l=0}^{q3} \phi_l \Delta \ln GFCE_{t-l} + \sum_{m=0}^{q4} \phi_m \Delta \ln TRADE_{t-m} + \\ & \delta_1 \ln AGRIC_{t-1} + \delta_2 \ln FDI_{t-1} + \delta_3 \ln INF_{t-1} + \delta_4 \ln GFCE_{t-1} + \delta_5 \ln TRADE_{t-1} + \\ & \delta_6 DAGRIC + \delta_7 DGFCE + \varepsilon_t \end{aligned} \quad (3)$$

Where Δ is the difference operator and δ_i are the long run multipliers. The results of the ZA unit root test shows that the dependent variable undergoes a structural break in 2006. The dummy variable *DAGRIC* is introduced to represent the structural break.

The dummy variable *DAGRIC* takes a value of 0 until 2006 and 1 thereafter for Agriculture value added. Another dummy variable, *DGFCF* is introduced to represent the structural break that occurs in 2012. *DGFCF* takes a value of 0 until 2012 and 1 thereafter for Gross Fixed Capital Formation. To conduct the bounds test for cointegration, the optimal lag of the model must be determined and is as shown below:

Table 1.7

Optimal Lag Selection for Model

Endogenous variables : Ln Agric Ln Fdi Ln Inflation Ln Gfcf Ln Trade DAgric DGfcf

Lag	LogL	LR	df	FPE	AIC	HQIC	SBIC
0	-25.7349			1.80E-08	2.04593	2.15221	2.36656
1	126.911	305.29	49	3.00E-11	-4.43196	-3.58172	-1.86692*
2	171.054	88.285	49	6.60E-11	-4.12837	-2.53417	0.681076
3	280.277	218.45*	49	7.80E-12	-7.8923*	-5.55414*	-0.838443
4	.	.	49	-2.2e-73*	.	.	.

Source: Author's Estimates

* indicates lag order selected by the criterion

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

FPE: Final Prediction Error

AIC: Akaike Information Criterion

HQIC: Hannan-Quinn information Criterion

SBIC : Schwarz Bayesian Information Criterion

Each of the information criteria as seen in Table 1.7 determine the optimal lag length for the model. The Akaike Information Criterion is used to select a lag length of three (3).

4.15.1 Bounds Test for Cointegration

The bounds test is estimated based on the F-statistic test. An F statistic greater than the I(1) bound implies cointegration in the equation, an F-statistic lower than the I(0) bounds implies no cointegration, and an F-statistic between the bounds is

inconclusive (Pesaran, Shin, & Smith, 2001). The results of the bounds test are as shown below:

Table 1.8

Results of the ARDL Bounds Test

LNAGRIC = f(LNFDI, LNINF, LNGFCF, LNTRADE, DAGRIC, DGFCF)		
F-Statistic	K	
7.144***	6	
Critical Value Bound		
Significance	I0 bound	I1 bound
10%	2.12	3.23
5%	2.45	3.61
1%	3.15	4.43

Note: ***denotes significance at 1%

Source: Estimated from STATA IC 16.1

From Table 1.8, the F-statistic of 7.144 is greater than the I(1) bounds at all significant levels implying the existence of a long run association between the variables in the model. As such, the long and short run relationship between the variables and their coefficients are estimated using the ARDL approach. The selected lag models are ARDL (2, 3, 3, 3, 3, 3, 3) for LNAGRIC and its covariates.

4.16 ARDL Model Estimation

The long run and short run relationships between the variables in the model with their respective coefficients are generated through the ARDL approach.

Table 1.9

Estimated Long Run Coefficients

Dependent Variable : LNAGRIC			
Selected Model: ARDL (2, 3, 3, 3, 3, 3, 3)			
36 observations used for estimations from 1984 to 2019			
Variable	Coefficient	Std. Error	Probability
LNFDI	-.12758***	.03084	0.006
LNINFLATION	.07706**	.02853	0.036
LNGFCF	.05605	.12088	0.659
LNTRADE	.07344	.06556	0.305
DAGRIC	-.10014	.0918	0.317
DGFCF	-.36383***	.07804	0.003
CointEq(-1)	-1.4654***	.28073	0.002
Cointeq = LNAGRIC – (-.12758*LNAGRIC + 0.07706*LNINFLATION + 0.05605*LNGFCF + 0.07344 – 0.10014*DAGRIC – 0.36383*DGFCF + 4.3225)			

Note: ** and *** denotes significance at 5% and 1% respectively

Source: *Estimated from STATA IC 16.1*

From Table 1.9, it is revealed that FDI established a negative and significant effect on Agricultural Value Added. Inflation had a positive and significant effect on Agricultural Value Added. Gross Fixed Capital Formation and Trade both had positive yet insignificant effects on Agriculture Value Added.

FDI inflows had a coefficient of -0.127 at the 1 percent significance level. This implies that the value added to the agricultural sector falls by 0.127% when FDI grows by 1%. Similar observations were made in Iddrisu et al (2015) where FDI was determined to have a negative impact on the growth of the agricultural sector and Djokoto (2011) who did not find a causal link between FDI and the growth of the agricultural sector. The co-efficient of inflation in the long run was 0.077 at the 1

percent significance level. A 1% increase in inflation is therefore expected to increase agricultural sector value to GDP ratio by 0.077%. The significance of the adjustment term, CointEq(-1) validates the observed effects in the model.

Table 2.0

Estimates of the Short-Run Error Correction Model

Dependent Variable: LNAGRIC			
Variable	Coefficient	Std. Error	Probability
D(LNAGRIC(-1))	.7575*	.2411	0.020
D(LNFDI)	.2537***	.0466	0.002
D(LNFDI(-1))	.1512***	.0361	0.006
D(LNFDI(-2))	.108***	.0284	0.009
D(LNINFLATION)	-1.05	.0448	0.057
D(LNINFLATION(-1))	0.016	.0306	0.612
D(LNINFLATION(-2))	0.041	.0230	0.119
D(LNGFCF)	-.3771	.1551	0.051
D(LNGFCF(-1))	-.2382	.1255	0.106
D(LNGFCF(-2))	-.0692	.0505	0.220
D(LNTRADE)	-.0819	.1205	0.522
D(LNTRADE(-1))	.1598	.0791	0.090
D(LNTRADE(-2))	-.2884**	.1054	0.034
D(DAGRIC)	-.152	.1601	0.379
D(DAGRIC(-1))	-.1375	.1696	0.448
D(DAGRIC(-2))	-.2412**	.0915	0.039
D(DGFCF)	.626***	.1281	0.003

D(DGFCF(-1))	.601***	.1433	0.006
D(DGFCF(-2))	.442***	.1193	0.010
Constant	4.322***	1.1726	0.010

Note: ** and *** denotes significance at 5% and 1% respectively

Source: Estimated from STATA IC 16.1

The results above indicate that a percentage change in the first lag of Agriculture value to GDP ratio is associated with a 0.75% increase in Agriculture value to GDP ratio at the 5% significance level on average ceteris paribus. The coefficients of current and lagged FDI are all positive and significant at the 1 percent significance level. A percentage change in the current level of FDI inflows is associated with a 0.25% increase in Agriculture value to GDP ratio ceteris paribus. The first lag of FDI inflows is associated with a 0.15% increase in Agriculture value to GDP ratio when it grows by 1% ceteris paribus. The second lag of FDI inflows is associated with a 0.10% increase in Agriculture value to GDP ratio when it increases by 1% on average ceteris paribus. The second lag of trade openness has a negative and significant association with Agriculture value added. A percentage change in the second lag of trade openness is associated with a 0.28% decrease in Agriculture value added at the 5% significance level ceteris paribus.

4.17 Model Diagnostics

The models used in this research study are free of the issues which affect the accuracy of estimations and the robustness of econometric models such as serial correlation, heteroscedasticity, normality, and stability. This is shown on the figures

below. The probability statistics shows that the model is determined to be appropriate for analysis and policy implications.

Table 2.1

Results of Model Diagnostics

Diagnostics	LNAGRIC = f(LNFDI, LNINF, LNGFCF, LNTRADE, DAGRIC, DGFCF)	
	Test Statistic	Probability
DW Statistic	2.573088	N/A
Durbin Alt	2.588	0.4596
White Test	33	0.4180
ARCH LM	4.235	0.2371
Breusch-Pagan Hetttest	2.10	0.1471
Ramsey RESET	4.63	0.1199
Jarque-Bera	0.3417	0.8429

Note: The test statistics above are Durbin Watson statistics for serial correlation, IM's test for homoskedasticity, LM test for autoregressive conditional heteroskedasticity, Breusch-Pagan test for heteroskedasticity, Ramsey Reset test for functional form misspecification and stability, and Jarque-Bera test for non-normal errors respectively with accompanying probability values

The Cumulative Sum (CUSUM) of the recursive residuals and their squares was generated to test the stability of the model. The stability test shows whether the parameter estimates are stable over time (Pesaran et al, 2001). The null hypothesis of the CUSUM indicates that the coefficient vector remains the same over the period. The t statistics are plotted against the critical bounds at the 5% confidence level. If the plots

remain within the critical bounds, we are unable to reject the null hypothesis and thus conclude that all the coefficients are stable. The diagrams supporting the concluding result of model stability are shown in the Appendix.

CHAPTER 5: CONCLUSION & RECOMMENDATIONS

5.11 Introduction

This chapter concludes the research by providing a summary of the findings and the implications of the research results. Recommendations dependent on the outcome of the study are made as well as recommendations on the conducting of more research to overcome the limitations faced in this research study.

5.12 Summary of Findings

The core purpose of this research study was to determine the effect of FDI on the growth of the agricultural sector in Ghana. The significance of said effect was investigated as well. A PP and ADF test were conducted to ascertain the stationarity of all variables. A ZA test was also conducted to account for structural breaks within the model. Results from these tests showed inflation was stationary at level or integrated at $I(0)$ and the remaining variables stationary at first difference or integrated at $I(1)$.

The bounds test was applied to check for cointegration for the model under review. The existence of a long run relationship between the variables made it suitable to use an ARDL model with an error correction term to determine the long and short run relationship for the model. Regression results from the model was free from issues of serial correlation and heteroskedasticity. They were normally distributed, and the parameters were determined to be stable.

Results of the short run relationship from the ARDL model estimates indicated significance between the variables at the 5% or 1% confidence level. The current level of FDI inflows and its accompanying lags had a positive and significant association

with Agriculture value added while the second lag of trade showed an adverse and significant association to Agriculture value added.

Results of the long run relationship showed that FDI inflows has a negative and significant effect on the growth of the agricultural sector. Therefore, the null hypothesis of the research study cannot be rejected. Inflation is determined to have a positive and significant effect on the growth of the agricultural sector. The counterintuitive results of FDI having a negative effect on the growth of the agricultural sector could be attributed to the underdeveloped state of the sector in Ghana. Most stakeholders in the sector are smallholders and are located in areas that lack the infrastructure necessary to connect them to markets (Pauw, 2018). As such FDI in the sector may have a crowding out effect as already existing firms within the sector will be unable to compete with the productivity of FDI firms.

5.13 Conclusion

FDI is theoretically perceived to be a significant driver of growth. However, sectoral research on the effects of FDI are not as consistent. Hirschman (1958) and the UNCTAD World Investment Report (2001) both posit that the agricultural sector has the least capacity to absorb foreign technology and enjoy the spillover benefits associated with FDI. Research conducted on this relationship dynamic between FDI and agricultural growth in Ghana by Iddrisu et al. (2015) determined FDI to have an adverse effect on the productivity of the agricultural sector in the long run but a positive relationship in the short run. This research study provides results that are consistent with the above schools of thought with FDI negatively affecting the growth of the agricultural sector in the long run but has a positive relationship with its growth in the

short run. However, these results do not immediately translate to FDI being a negative for the growth of the agricultural sector. Rahman (2015) posited that FDI led growth is dependent on the level of human capital within the country. Therefore, variables pertaining to the level of human capital in the agricultural sector could have been included as well as the effects of laws passed affecting the sectors and the already existing infrastructure for the sector. These are factors that can affect how FDI impacts the agricultural sector.

5.14 Recommendations

The following are recommendations for the government considering the results and for further studies regarding FDI and the growth of the agricultural sector.

5.14.1 Recommendations for Government

Considering the Agricultural sector employs half the working population and is the mainstay of most individuals in rural areas (World Bank, 2018), the Government should focus on the improvement of the human capital within the sector, training more individuals and boosting efforts to evolve the sector. Government must also focus on investing in equipment and much needed infrastructure such as roads. The laws and frameworks surrounding private business in the agricultural sector needs to be reformed and less restrictive (World Bank, 2018). Improvement in these facets would positively affect growth in the agricultural sector and increase the ability of the agricultural sector to absorb the spillovers associated with FDI.

5.14.2 Recommendations for Further Studies

Further research can be done on the relationship dynamic between FDI and the growth of the agricultural sector. The use of a larger data sample would be able to incorporate more data points for even more accurate estimates. Also, the addition of variables such as the exchange rate, the labour force, and the existing level of technology within the sector could have a significant effect on the observed results.

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APPENDIX

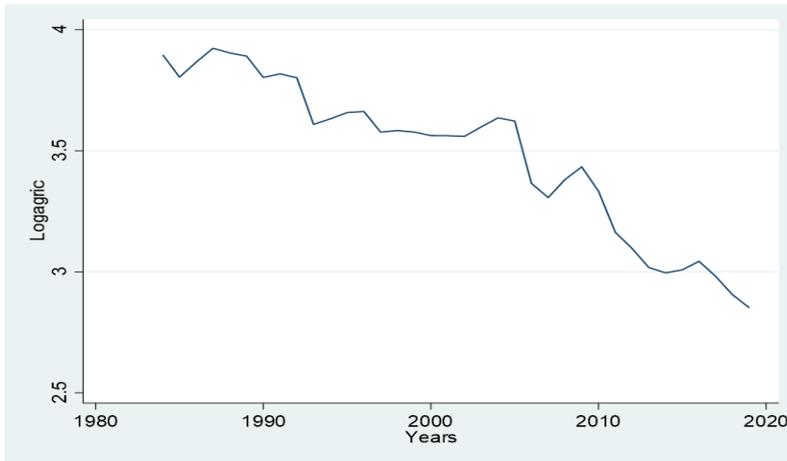


Figure 1.7. Plot of Agriculture Value Added in Ghana 1984 to 2019

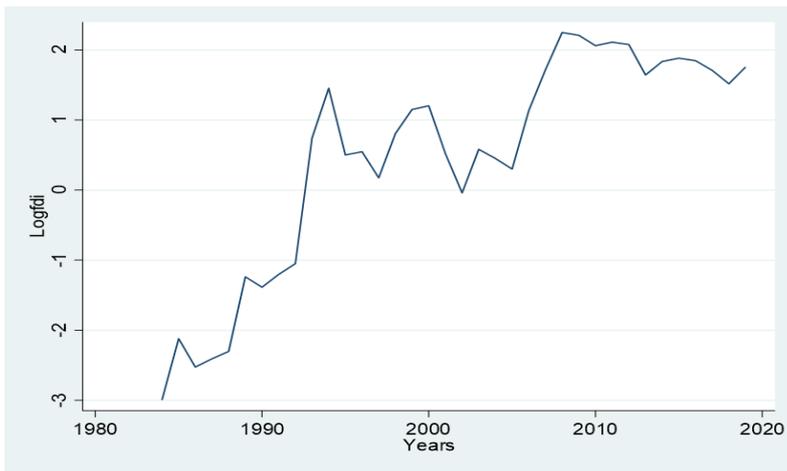


Figure 1.8. Plot of FDI Inflows to Ghana 1984 to 2019

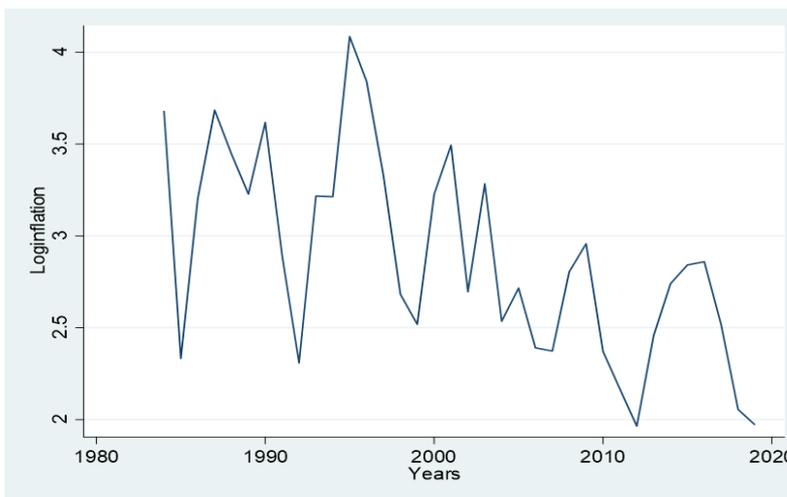


Figure 1.9. Plot of Inflation in Ghana (CPI Annual%) 1984 to 2019

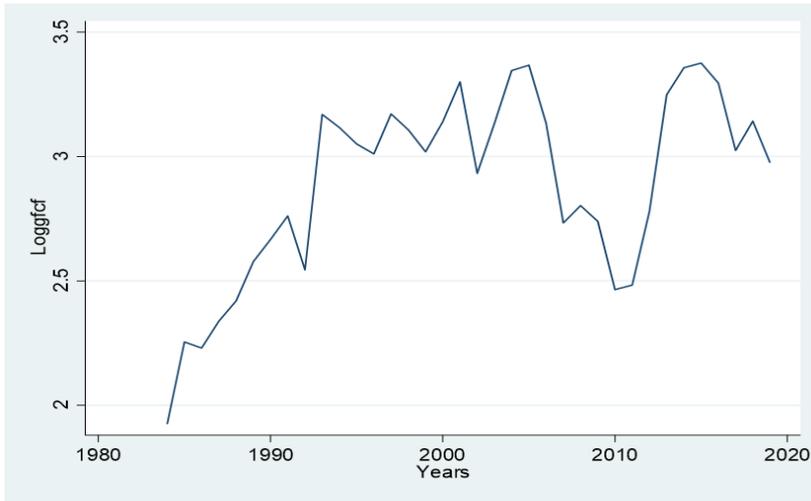


Figure 2.0. Plot of Gross Fixed Capital Formation 1984 to 2019

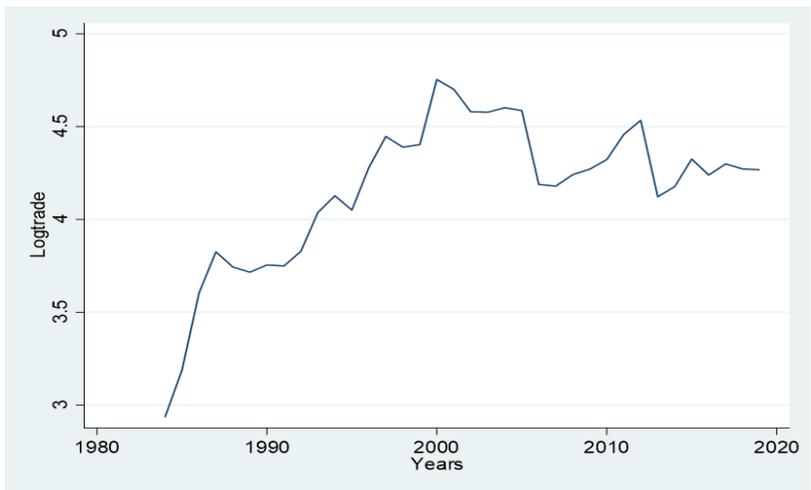


Figure 2.1. Plot of Trade Openness in Ghana 1984 to 2019

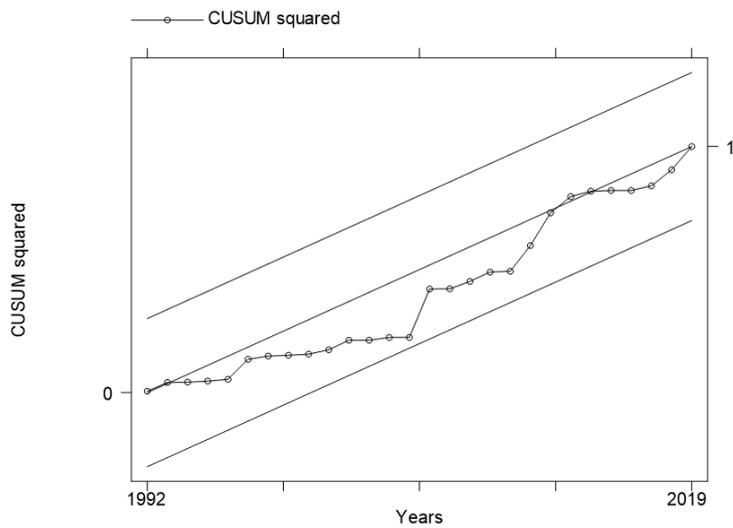


Figure 2.2 Cumulative Sum of Squared Residuals