

**INFLATION, FOREIGN DIRECT INVESTMENT AND ECONOMIC  
GROWTH IN GHANA**

**BY**

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## **DECLARATION**

I , JAMES ANDINUUR, hereby declare that this thesis is the result of my own research and that not even part of it has been submitted elsewhere for any degree.

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## ABSTRACT

In spite of the lack of any concrete empirical study establishing the causal interaction between inflation, foreign direct investment and economic growth in Ghana, the Bank of Ghana since 2002 has been pursuing inflation targeting monetary policy at reducing inflation with the ultimate aim of achieving high and sustainable economic growth. This calls for this study which seeks to explore linkages between inflation, foreign direct investment and economic growth in Ghana using annual time series data covering the period 1980 to 2011. The study employs the cointegration approach by Pesaran, Shin and Smith (2001) and the Granger causality testing procedure suggested by Toda and Yamomanto (1995) to empirically examine the relationships and directional relationships between the variables. The study finds that GDP growth relates positively and negatively with foreign direct investment and inflation respectively both in the long run and short run. The relationship between inflation and foreign direct investment is positively. Furthermore, bidirectional causality was established between GDP growth and FDI, While, a unidirectional causal links were found from GDP and FDI to inflation. There was no directional causal relationship inflation to GDP and FDI. Finally, a unidirectional causality was discovered running from GDP to inflation. All causal links were statistically significant. More attention should be paid to the growth of output on inflation because of the unidirectional causality running from real GDP growth to inflation. Higher level of output growth is very crucial to ensure price stability in Ghana. Therefore, for the fight against inflation to be winning, policies should be geared towards addressing the real economic factors that hinder GDP growth in Ghana. To maintain a sustainable economic growth, Ghana have to be encouraged and supported to attract more foreign direct investment to stimulate growth.

## **DEDICATION**

This thesis is dedicated to the Almighty God.



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## LIST OF ABBREVIATION

ADF	Augmented Dickey-Fuller
AGC	Ashanti Goldfields Company
ARDL	Autoregressive Distributed Lag
CPI	Consumer Price Index
ECM	Error Correction Model
ERP	Economic Recovery Programme
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GIPC	Ghana Investment Promotion Council
HIPC	Highly Indebted Poor Countries
IMF	International Monetary Fund
OLS	Ordinary Least Squares
PNDC	Provisional National Defence Council
SAP	Structural Adjustment Programme
SUR	Seemingly Unrelated Regression
UNCTAD	United Nations Conference for Trade And Development
VAR	Vector Autoregressive
VAT	Value Added Tax

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the study

Achieving high sustainable economic growth with low inflation as a poverty reduction strategy is the principal objective of policy makers in both developed and developing countries (Khan and Senhadji, 2001). This is because; high growth makes it possible to raise the living standards of the impoverished in the society. Hence, it begets the opportunity for some people to be made better off in society without making others worse off (Douthwaite, 1997). In addition, low inflation and high long term growth improves the efficient allocation of resources and increases employment in the economy.

However, the existence and nature of the inflation- economic growth nexus is one of the most significant macroeconomic controversies (Li, 2006). The bone of contention is whether inflation is indispensable for growth. Despite the varied theoretical and empirical views on the relationship between inflation and growth, there are copious empirical studies that confirm that high inflation negatively impact growth ( Fisher, 1993; Barro, 1996; Ghosh and Phillips, 1998 and Khan and Senhadji, 2000). When inflation is high, it creates uncertainty and distortions in the economy thereby impeding sustainable growth through spending and investment. High price levels also reduce the international competitiveness of countries by making their export relatively more expensive thus impacting on the balance of payments. Not only that, the effects of high inflation on growth can be very detrimental when it is unanticipated. This is because, unanticipated inflation causes confusion between relative and aggregate price changes leading to

misallocation of resources and retard growth in the long run. (Feldstein, 1982; Neill, 2000 and Khan and Sendaji, 2001).

Whiles there is a general consensus that high and volatile inflation hurts an economy; however, much less agreement exists about the precise relationship between inflation and economic performance, and the mechanism by which inflation affects economic activities of nations. Nevertheless, Huybens and Smith (1999) and Boyd (2001) contend that foreign direct investment (FDI) is an important channel through which the effect of inflation is indirectly transmitted in economic growth for the betterment of society.

Low inflation rate is taken to be a sign of internal economic stability in the host country and Low rate of inflation in a country increases the return on foreign direct investment and is an indicator of macroeconomic stability and considered a sign of the willingness of the government to balance its budget and the ability of the central bank to conduct appropriate monetary policy (Schneider and Frey, 1985). Low level of inflation in a country encourages FDI. When inflation is low, nominal interest rate declines and as a result cost of capital is low. The availability of capital at cheap lending rate enables foreign direct investors not only to locate better partners in the host country with sufficient domestic investment to supplement but also to maximize the return on their investment. Hence, easy availability of capital at lower interest rate and high domestic consumption in the host country as a result of low price levels would attract FDI to spur growth.

The dynamic role of FDI as a catalyst for growth has become more imperative for developing countries. According to the World Bank (2007), global FDI inflows reached a record of US\$1.1trillion in 2006 and there has been a continuing increase in FDI inflows into developing economies. FDI which is an important source of development financing greatly contributes to

growth by increasing total investment in the recipient country and increasing productivity gains through technology and managerial skills. On the other hand, it can also happen that FDI may hurt the host economy, for instance when foreign investors claim scarce resources or reduce investment opportunities for local investors (Mellow, 1999 and Herzer et al., 2006). These ambiguities have opened the scope for a large empirical literature on the FDI and growth nexus on both developed and developing countries (Mello, 1997, 1999). This nexus has been studied by explaining the determinants of both growth and FDI, the role of transnational companies (TNCs) in host countries, and the direction of causality between the two variables.

Despite the plethora of studies on the direction of causality between FDI and economic growth, the empirical evidence is not clear for country groups. Following the criticisms in recent studies (Kholdy, 1995) of the traditional assumption of a one-way causal link from FDI to growth, new studies have also considered the possibility of a bidirectional or non-existent causality between FDI and growth.

From the numerous existing studies, the causal link between FDI and economic growth as an empirical question seems to be dependent upon the set of conditions in the specific host country economy. Chowdhury and Mavrotas (2005) have suggested that individual country studies be done to examine the causal links between FDI and economic growth since it is country specific.

In Ghana, high inflation has been one of the intractable problems that have bedeviled the economy for a long time, and its relevance in the country's chequered economic history seems to lend some credence to the belief that high and volatile inflation can be destructive to economic growth (Kwakye, 1981). Ghana's experience somewhat supports Friedman's (1980) observation that high inflation is a disease, which is dangerous and fatal and if not checked can devastate a nation.

The harmful effects of inflation call for fervent efforts to manage it. At the same time, the promise of economic growth is so attractive and desirable. In Ghana, one of the most important efforts of controlling inflation to attract FDI to spur growth occurred under the Economic Recovery Programme and Structural Adjustment Programme adopted in 1983. Recently, the fight against inflation and the quest to achieve faster economic growth have assumed great intensity with the adoption of inflation targeting by the central bank of Ghana in 2007. This is premised on the belief that low inflation will attract FDI leading to higher economic growth.

Apparently, empirical debates about the causal nature of the relationship between inflation, FDI and growth are still subjects of concern to the macroeconomists because empirical literatures on different economies also have conflicting results. These three important macroeconomic variables cannot seem to decide how their relationship should be. Thus, the nature of the relationship depends greatly on the structure of the economy. This therefore means that results from any empirical study appear to defy any kind of generalization (Bruno and Easterly, 1996).

## **1.2 Problem Statement**

Price stability is a recipe for high and sustainable economic growth in both developed and developing nations, despite the indeterminate causal links between inflation, FDI and economic growth on both the theoretical and empirical grounds. This therefore raises skepticism about the potency of lowering inflation to attract FDI to stimulate growth.

Notwithstanding the controversy and uncertain nature of the relationship between inflation and growth and the channels through which inflation affect real economic activities, Ghana is pursuing price stability to ensure low and stable prices in order to attract FDI to enhance high

sustainable growth. Therefore, both fiscal and monetary policies have been made and inflation has stabilized in single digit since 2010 to 2012.

Obviously, since the Bank of Ghana has adopted price stability as its major objective, the economy has witnessed inflation following a drastic down trend (26.7% in 2003 to 8.7% in 2011), while net FDI inflows (US\$13.7 million in 2003 to US\$3.2 billion in 2011) and real GDP growth (5.2 % in 2003 to 14.4% in 2011) recuperating from their repressive states. However, although, the trends observed above imply correlation between inflation, FDI and growth, they do not imply causation. Therefore, it is not too apparent whether the falling inflation has caused the upward trends in FDI and growth in Ghana.

While this monetary policy may probably be one of the best policy options available to the country, given the current performance of the economy, the outcome of the policy on real sector activities has not been subjected to any empirical investigation (Quartey, 2010). It is in view of this that an empirical assessment of the inflation-FDI-growth link in Ghana becomes imperative.

### **1.3 Objectives of the Study**

The main objective of this study is to examine the linkages between inflation, FDI and growth in Ghana between the periods 1980 and 2011 using the Bound Test of cointegration and the Toda and Yamamoto (1995) causality Method. In order to achieve this broad objective, the thesis is specifically designed to:

- Explore the relationships between inflation, FDI and growth in Ghana.
- Examine the causal linkages between inflation, FDI and growth in Ghana.

#### **1.4 Hypotheses of the Study**

This study aims at examining the dynamic linkages between inflation, FDI and growth in Ghana.

The study therefore seeks to test the following null hypotheses.

- There are no relationships between inflation, FDI and growth in Ghana
- There are no causal linkages between inflation, FDI and growth in Ghana

#### **1.5 Justification of the Study**

There are several reasons why the dynamic interaction between inflation, FDI and economic growth must be studied. First, Foreign Direct Investment is an important determinant of the growth process of Ghana. Therefore, a literature that will empirically examine the inflation-FDI-growth causal link is important because high rates of inflation harm FDI inflows into the economy, thus slowing the growth process. The direction of causality between FDI and growth will be crucial for the formulation of policies that will either encourage foreign investors or deter them.

Another factor that makes this study worth undertaking is that most of the studies on the linkages between inflation-FDI and growth are based on cross country studies. However, the conclusion from such studies may be less relevant at a country level. In addition, aggregate cross-country studies constrain the coefficients of inflation and FDI to be the same across countries. 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. Previous studies on the dynamic interactions between inflation-growth and FDI-growth in Ghana suffer misspecification bias in terms of omitting variables. Some of them also present conflicting

results (see Frimpong and Oteng, 2006 and Antwi et al., 2013). This study is different from others because of the sample size, the models and the method used in analyzing the data.

Finally, this study will close the obvious research gap that already exists in the literature. It will 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-growth nexus in Ghana.

## **1.6 Organization of the Study**

The study is organized into six chapters. The first chapter is the introduction which covers the background to the study, problem statement, hypothesis, justification of the study and organization of the study. Chapter two presents summary of the existing theoretical and empirical literature on the inflation-FDI-growth interaction. Chapter three provides an overview of inflation, FDI and growth development in Ghana.

Chapter four is the methodology for the study. Chapter five focuses on models estimation and data analysis. Chapter six comprises of summary, conclusions and policy recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents the relevant theoretical and empirical literature on the linkage between inflation, foreign direct investment and economic growth. The first section explores the theoretical underpinning of the study, the second section examines empirical literature of interest to the topic, and whiles the last section draws conclusions from both the theoretical and empirical literature.

#### **2.2 Theories on Inflation and Growth**

In this section, the Keynesian and the Neo-classical models are used to underpin the relationship between inflation and growth.

##### **2.2.1 Keynesian Theory**

The Keynesian model is based on Aggregate Demand (AD) and Aggregate supply (AS) analysis. The main feature of this theory is that, in the short-run, the AS curve slopes upwardly instead of being vertical. When the AS curve is vertical, shocks to the demand side of the economy affects only prices. However, Dornbusch, et al., (1996) hint that as a result of this upward sloping nature of the AS curve, and changes in demand can now result in changes in prices and output. As a result of the short-run dynamic equilibria of the AD and AS curves, there is the formation of an

adjustment path which initially exhibits a positive relationship between inflation and growth, but later turns negative. The positive interaction between inflation and growth generally occurs as a result of time inconsistency problem. Therefore, some producers are of the opinion that their output prices are raising while those of others' remain the same. So they produce more output, thereby increasing the overall output rises (Dornbusch, et al, 1996).

On the contrary, Blanchard and Kiyotaki (1987) think that this positive relationship is traceable to the agreements which firms make to produce goods at higher price in the in future. Soon after that, the link becomes negative which describes the occurrence of stagflation when output falls or remains constant against rising prices ( Gokal & Hanif, 2004).

### **2.2.2 Neo-classical Theory**

Within the neoclassical school, there are several models that attempt to explain economic growth of nations. However, the dynamic relationship between inflation and growth in output can be deduced.

Solow (1956) was one of the first to develop a model to explain growth in output. Solow's model exhibits diminishing returns to scale and labour and constant returns to both factors jointly. Solow (1956) assumed that changes in technology which mainly explain long-term growth is determined exogenously (Todaro, 2000). The Early neo-classical Solow believed that there exists no relationship between inflation and growth as growth was assumed to be exogenously determined (Ray, 1998).

Mundell (1963) provided a dynamic mechanism linking inflation to economic growth. In his model, when inflation increases, it immediately reduces the wealth of the people. This is premised on the fact that the rate of return on a person's real money balances falls. Consequently, people save more in other assets which increase their price and pulls down the interest rate. This boosts up the capital accumulation in the economy thus speeding up growth in output.

Tobin (1965) also presented a similar mechanism which relates inflation with economic growth by developing Mundell's model. Tobin followed Solow (1956) and incorporated the assumption that money is a store of value in the economy. In Tobin's model, when the rate of inflation increases, it motivates people to replace interest bearing assets with money leading to greater capital intensity and stimulating economic growth. Thus, inflation relates positively with growth in output.

Sidrauski (1967) proposed a model where money is 'Superneutral'. He explains that Superneutrality only holds when real variables, including the growth rate of output, are independent of the growth rate in the money supply in the long-run. The major result in Sidrauski's economy is that an increase in the inflation rate does not affect the steady state capital stock. As such, neither output nor economic growth is affected.

Stockman (1981) another neo-classical theorist provided another explanation to relate inflation and growth. According to his model, an increase in inflation could significantly reduce the output level. In Stockman's model, money is assumed as a complement to capital. So when inflation raises, the purchasing power of money erodes, which leads to low capital accumulation

and consequently, there is a decline in output growth. In this way Stockman provided a strong justification for a negative linkage between inflation and economic growth.

Thus, within the neoclassical framework, the models yield varied results with regard to the relationship between inflation and growth. Thus inflation can have positive or negative or no effect on growth.

## **2.3 Theories on inflation and Foreign Direct Investment**

### **2.3.1 Fisher Equation**

The Fisher equation explains that the nominal riskless interest rate ( $k_{rf}$ ) is composed of the real riskless rate of interest ( $k^*$ ) plus expected inflation rate (EI). Mathematically, the Fisher equation is expressed as:  $(k_{rf}) = k^* + EI \dots\dots\dots (1)$

Equation (1) was developed in terms of the 'expectations' of financial markets participants. This means that investors determine their required riskless rate of return before they invest their money. This is because; the nominal riskless rate of interest is the foundation upon which all other rates of return are built.

From the Fisher equation, when inflation is low, nominal interest also falls. This implies the anticipated rate of return on investment will be high. In addition, cost of capital would also be low and hence financial cost on new investment will be low. Since foreign investors try to reduce their financial cost in order to maintain price competitiveness, the availability of capital at low lending rates may enable foreign investors not only locate better partners in the host country

with sufficient domestic investment to supplement but also to maximize the return on their investment. Hence easy availability of capital at lower nominal interest rate in the host country would attract investors from foreign countries.

Thus, from the Fisher equation, when inflation is low, nominal interest rate is also low. Therefore, financial cost on foreign direct investment is low, and rate of return on investment is high. Therefore, inflation negatively affects foreign direct investment.

## **2.4 Theories of Foreign Direct Investment and Growth**

### **2.4.1 Endogenous Growth Theory**

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 place emphasis on human capital accumulation and externalities on growth. In these regard growth rate of developing economies is seen to be reliant on the extent to which these countries can accept 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. 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. 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's 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; Borensztein et al., 1998 and De Mello, 1999).

Nevertheless, Dowling and Hiemenz (1982) and Lee 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 macroeconomic climate to attract foreign investors. The speedy growth in the host nation also builds the self-assurance of foreign investors investing in the host country. Thus, both FDI and economic growth relate positively and leads to bidirectional causality.

## **2.5 Empirical Literature Review**

Numerous researchers have examined the inflation-FDI-growth nexus for cross country, developed countries and developing economies using a wide variety approaches. However, there are few widely agreed on results. In this section, a selected number of the empirical studies are

reviewed. The empirical studies reviewed are classified into four groups: (i) inflation, FDI and Growth (ii) Inflation and FDI, (iii) Inflation and Growth and (iv) FDI and Growth.

### **2.5.1 Inflation, Foreign Direct Investment and Growth**

Mehmet (2011) explored the association between growth, FDI, trade and inflation in turkey using annual time series data over the period from 1970 to 2008. The results of the Johansen cointegration test revealed that inflation and FDI are positively related to growth. Faiza et al. (2012) also investigated the impact on foreign direct investment due to the growth and inflation of Pakistan using annual time series data over the period of 1990 to 2011. FDI is taken as dependent variable where as GDP and inflation are taken as independent variables. To assess the impact of FDI on growth and inflation time series data regression was used. The result suggests that foreign direct investment relates positively with inflation and growth. As clearly seen from the two studies, the conflicting results are due to the different estimation techniques. Whereas Mehmet employed Johansen cointegration test, Faiza et al engaged the multiple regression analysis. Also, the former added Trade as a control variable to prevent omission bias.

Similarly, Taiwo (2011) examined the long-run co integration relationship between inflation, investment and growth in Nigeria over the period 1980 to 2006. The results from the ordinary least squares indicated that inflation relates negatively and positively with growth. Both studies fail to check for causality between the inflation, FDI and growth.

Omankhanlen (2011) explored the effect of exchange rate and inflation on foreign direct investment and its relationship with economic growth in Nigeria using annual time series data over the period 1980 to 2009. Government expenditure and gross fixed capital formation were

added as control variables. A linear regression analysis was used on the thirty year data to determine the relationship between inflation, exchange rate, FDI inflows and economic growth. The study reveals that inflation has no effect on FDI but FDI positively affect economic growth in Nigeria.

The above literature present mixed findings on the relationships between inflation, FDI and growth. The literature also failed to check for causality.

### **2.5.2 Inflation and FDI**

On the linkage between inflation and FDI, Udoh and Egwaikhide (2008) used annual time series data covering the period 1970 to 2005 to examine the effect of exchange volatility and inflation uncertainty on FDI in Nigeria. They employed the GARCH model to estimate inflation uncertainty and exchange rate volatility. The findings indicate that inflation has a negative effect on FDI and it is statistically significant. In addition, Ade et al., (2011) explored the link between corruption, FDI and growth in Nigeria using annual time series data over the period 1990 to 2009. The Johansen approach to cointegration lends support to the results of Udoh and Egwaikhide (2008) that low and stable inflation attracts FDI inflows into developing countries to spur growth. The granger causality test however, proves the absence of any directional causality between inflation and FDI.

Sajib et al. (2012) also analysed the role of FDI and trade on the growth in Pakistan by employing the Simple Least Square Method using annual time series data from 1990 to 2008. The results indicated a positive and statistically insignificant association between inflation and FDI. Shumaila et al. (2012) agreed with Sajib et al. (2012) when they took a step further to study

the impact of capital inflows on domestic inflation in Pakistan over the period 1980 to 2010 using co integration test and error correction model. However, their findings conflict the work of Djokoto (2012) who investigated the effect of investment promotion on foreign direct investment inflow in Ghana over the period 1970 to 2009 and discovered a negative relationship between inflation and FDI. The conflicting result is due to the fact that Djokoto uses co integration technique and treats inflation as a control variable.

### **2.5.3 Inflation and growth**

Linking inflation to growth, Barro (1995) explored the inflation–economic growth nexus using an extended version of the neoclassical growth model and annual data covering more than 100 countries from 1960 to 1990. They included other variables such as the ratio of investment to GDP and fertility rate in their model. Using a system of regression equations, and holding a certain number of the country characteristics constant, the results indicate that there is a statistically significant negative relationship between inflation and economic growth only when high inflation experiences are included in the model. Bruno and Easterly (1995) also use annual data series of 26 countries that had high inflation crises at some point in time over the period 1961 to 1992. The data series were used to specifically assess the performance of the country before, during and after high inflation crisis. After controlling factors such as shocks including political crises, war and terms of trade, they validate the findings of Barro (1995) that high inflation negatively affects growth. However, Bruno and Easterly find that the impact of low to moderate inflation on growth is ambiguous. Thus, their findings are consistent with the view that the costs of inflation only become significant at relatively high rates of inflation.

Furthermore, Sarel (1995) examined the effects of inflation on growth from 87 countries between 1970 and 1990. The study used a panel of annual data on population, GDP, consumer price indices, terms of trade, real exchange rates, government expenditures and investment as control variables. Employing ordinary least square estimation technique, the study found evidence that the function that relates inflation to growth may have a structural break which occurs when the rate of inflation is 8%. Below that rate, inflation does not have any meaning impact on economic growth. However, when the rate of inflation is above 8%, the estimated effect on inflation on growth is negative, and significant. Ghosh and Philips (1998) also used a panel data of 145 countries spanning from 1960 to 1996, to look at the relationship between inflation and growth. They employed a panel regression together with a linear treatment of the inflation-growth linkage. They also extensively examined the robustness to check whether the inflation –growth nexus appears in a multivariate regression analysis in a nonlinear fashion. Their findings to some extent harmonize with Sarel’s findings inflation negatively affects growth even though they did not find any structural break in the relationship between inflation and growth. However, Ghosh and Phillips discovered that at very low rates of inflation, inflation and growth are positively correlated. They further find that the relationship is convex. Taking into consideration the nonlinearity, they discover that the negative relationship between inflation and growth is apparent in both the time and cross section dimensions of the data.

In addition, Malla (1997) analyzed a small sample of Asian countries and countries belonging to OECD separately. After controlling for labor and capital inputs, the results showed a statistically significant negative relationship between economic growth and inflation including its first difference. However, the relationship is not statistically significant for the developing countries of Asia. In addition, Burdekin et al., (2000) employed a variant of Sarel’s (1995) econometric

procedure, using annual data for 21 developed countries and 51 developing countries including Ghana from 1967 to 1992. They included real GDP per capita, population growth and government expenditure as control variables to avoid omitted variable bias. Up to 3% threshold for developing countries, their findings conflict that of Malla's. However, up to 8% threshold for the industrial countries their studies validate the findings of Malla. The difference in results could be due to the fact that Malla did include control variables in his model to correct the problem of omission bias and misspecification of the model he used.

Malik and Chowdhury (2001) used co integration and error correction model to assess the long-run relationship between inflation and growth for India, Bangladesh, Pakistan and Sri Lanka using annual data. They discovered that inflation and growth are positively linked in all the four countries. Khan and Senhadji (2001) contend with Malik and Chowdhury when they analyzed the relationship between inflation and growth separately for developed and developing countries using panel data set from a total of 140 countries for the period 1960 to 1998. The authors located a negative and significant relationship between inflation and growth above a threshold level of 1-3% for developed countries and 11-12% for developing countries which is robust with respect to the method of estimation.

Chih (2009) estimated the causal interrelationships between inflation and economic growth within a simultaneous equations framework using cross sectional data of 140 countries over the 1970-2005 period. The results indicated that inflation is harmful to growth whereas the effect from growth to inflation is beneficial. On the relationship between inflation and growth, the outcome of the study confirms a negative relationship between inflation and growth. The granger causality test used by Chih confirmed a bilateral causal relationship between growth and inflation.

Whilst, the above empirical studies are cross-country, Faria and Carneiro (2001) also engaged a bivariate time series model with annual data over the period 1980 to 1995 to look into the same relationship between inflation and economic growth in the context of Brazil. Their findings confirmed a negative and statistically significant relationship between inflation and growth. In addition, Gokal and Hanif (2004) also employed correlation analysis and granger causality test to find out whether a meaningful relationship exist between inflation and growth in Fiji. The findings agree with that of Faria and Carneiro. However, Gokal and Hanif established a unidirectional causality from growth to inflation.

Furthermore, Hossain (2005) used annual data for the period 1954-2002 to consider the causal relationship between money growth, inflation, currency devaluation and economic growth in Indonesia. On the relationship between inflation and economic growth, the results from the Johansen and granger causality test simply that there is a negative relationship between inflation and growth and directional causality between the variables for the complete or any sub-sample period. In addition, a study by Odhiambo(2011), the causal relationship between inflation, investment and growth was examined in Tanzania over the period 1990 to 2009 using the Bounds testing approach. The study discovered that there is a unique co integrating relationship between inflation and growth. The results also proved the existence of a distinct unidirectional causal flow from inflation to growth, without any feedback.

Ahmed and Mortazat (2005) utilized annual data for the period of 1980 to 2005 to study the relationship between inflation and economic growth in Bangladesh. On the relationship between inflation and economic growth, the results from the Johansen and granger causality tests imply that there is a negative relationship between inflation and growth and a unidirectional causality running from inflation to growth. In addition, a study by Elias et al. (2012) on the long run

relationship between inflation and economic growth in Bangladesh over the period 1978 to 2010, they use the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests. The results agree with those of Ahmed and Mortazat that inflation relates negatively with growth in Bangladesh.

Erbaykal and Okuyan (2008) also, checked the relationship between inflation and economic growth in Turkey using annual data covering 1987 to 2006. By means of Bound Test developed by Pesaran et al. (2001), they discovered a negative and statistically significant relationship between the variables. Examining, the causality relationship between the two series, the Toda and Yamamoto (1995) approach confirmed a unidirectional causality running only from inflation to economic growth. Similarly, Edgar and Carrera (2009) used the co integration technique to observe the long-run relationship between inflation and growth in Mexico using annual data covering the period 1970 to 2007. They established a negative long-run relationship between inflation and growth which was statistically significant. Moreover, they used the Granger Causality test to study the causal linkage between the two time series and found a unit directional causality running from inflation and growth. Thus, the study of Edgar and Carrera agrees with that of Erbaykal and Okuyan.

Shahzad and Shahnawaz (2011) explored the inflation-growth nexus in Pakistan using annual data for the period of 1960 to 2006. The study employed the Johansen and granger causality test and establishes that inflation is positively related to growth. Causality is found to be unidirectional running from inflation to growth. Thus inflation is causing growth in Pakistan but not vice-versa. Kanchan and Chandan (2011) agreed with Shahzad and Shahnawaz when they investigated the dynamic relationship between inflation and growth in Malaysia using time series data from 1970 to 2007. In the short run, inflation negatively affects growth, however, in the

long-run, inflation is found to positively affect growth. The result further showed that there is a uni-directional causality running from only inflation to growth in Malaysia.

Philip (2010) employed the Johansen co integration technique to study the relationship between inflation and growth in Nigeria using annual data spanning from 1970 to 2005. The results of the study indicated that for the period of study, there was a negative co integration relationship between inflation and growth in Nigeria. The Engle and Granger Causality test was used to further check the causality relationship between the two variables. The study also established a uni- directional causality running from inflation to growth. In addition, Olaiya et al.(2012) used a trivariate vector error correction model and the Johansen and Juselius cointegration approach to study the relationships among inflation, government expenditure and economic growth in Nigeria. They used annual time series data and confirmed a negative cointegration relationship between inflation and growth and unidirectional causality running from economic growth to inflation.

Murbuah (2010) used the traditional granger causality test to examine the inflation-growth nexus in Ghana over the period 1955 to 2009. The study established a negative relationship between inflation and growth and a unidirectional causality from growth to inflation. Also, in ascertaining the revenue maximizing rate of inflation for Ghana and also investigating whether the revenue maximizing rate of inflation is growth maximizing, Quartey (2010) used time series data from Ghana over the period 1970-2006. The Johansen co-integration technique establishes a negative impact of inflation on growth over the period of study, which agrees with Murbuah. However, Quartey did not check for directional causality.

Thus, the empirical literature on inflation and growth establish that inflation relates negatively with growth. However, on causality, the literature presents mixed findings.

#### **2.5.4 FDI 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 of international technology transfer. Borensztein et al. (1998) tested the correlation between FDI and GDP in a cross-country regression framework with 69 developing countries over two separate time-periods 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 Borensztein et al support the results of Borensztein 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 countries in East 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, Bende et al. (2001) also studied the relationship between FDI and growth in four developing countries using time series annual 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.

Choe (2003) used a panel data to investigate how FDI and economic growth relate in eighty countries over the period 1971-1995. The results confirmed evidence of Granger causality relationship between FDI and economic growth in either direction. Basu et al., (2003) agreed with Choe 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 open 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 three 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 empirically findings of Chowdhury and Mavrotas support the results obtained by Basu et al.

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 established a unidirectional causality from growth to FDI. As seen from the two studies, the difference in results could be due to the difference in estimation techniques. Whiles 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 casual relationship between the variables. Similar type of study regarding the relationship between FDI and economic growth for Cyprus over the period 1976-2002 was examined by Feridun (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 Feridun conflict 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 these positive effects to be realized. In addition, Carkovic and Levine (2005) also studied how FDI relates with growth using panel 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 exert 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 casual relationship between FDI and GDP in a sample of 31 developing countries. Using estimators for heterogeneous 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 Rand that FDI and growth are positively related and that FDI spurs growth.

Herzer et al. (2008) also, revisited the FDI-led growth hypothesis for 28 developing countries. They used Engle-Granger cointegration and error correction model and discovered that there is no causality between FDI and economic growth. Abdus Samad (2009) contended with Herzer 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 co-integration 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).

Anowar 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 co integration and the Granger causality test. The findings indicated that there is no co integration 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. Quiser 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 result showed that the overall model is significant. There is a positive and significant relationship between GDP and FDI. The findings of Quiser et al conflict with that of Anowar and Mohammad because of difference in methodology, data and sample size.

Furthermore, Loesse 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 Pesaran 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 Loesse 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.

Sumei Tang et al. (2008) examine 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 helped in capital formation, in addition to accelerating economic growth via complementing domestic investment in China. Thus, the study confirmed the work of Loesse et al.

Similarly, Edoumiekumo (2009) employed the Johansen co integration 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 used the Johansen co integration 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-Sahara Africa Region. The study revealed a positive and significant long run relationship between FDI and GDP growth and a uni-directional causality running from GDP to FDI.

Obiamaka and Onwumere(2011) ascertained the extent to which growth in foreign direct investments (FDIs) influences 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 properties of the variables and adopted the Autoregressive Distributed Lag (ARDL) technique to estimate the model. The results indicated that foreign direct investment had 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 Onwumere. This could be attributed to the difference in methodology. The Johansen Cointegration test and the Autoregressive Distributed Lag (ARDL) technique yield 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 used the Johansen test and the Granger causality approach and find a positive and statistically significant relationship between foreign direct investment and growth and a bidirectional causality from the variables.

Adjaye (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. Frimpong et al., (2011) disagreed with Adjaye when they used the Toda and Yamamoto (1995) to explore the causal link between FDI and growth in Ghana using annual tie series data from 1970 to 2002. The results revealed that there is no directional causality between FDI and economic growth for the total sample period and the pre-SAP period. However, they discovered a unidirectional causality from FDI to growth during the post SAP period. The conflicting results could be due to the difference in estimation techniques used. Whereas Adjaye engaged the Johansen and Juselius (1990) multivariate maximum likelihood procedure, Frimpong 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 Auto Regression and Johansen co integration 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 GDP 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. 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 miss specifications biases and as such their findings may be misleading.

Even though, there are studies on inflation-growth and FDI and growth, there is scanty literature on inflation-FDI and growth. Therefore, this present work fills the gaps in the literature by using a trivariate VAR system to study the inflation-FDI –growth nexus in Ghana.

## **2.6 Conclusion**

The foregoing discussion on the literature reveals very interesting dimensions to the linkage between inflation, FDI and growth. From the theoretical literature reviewed, the relationship between inflation and growth can be positive or negative. Also a negative relationship exists between inflation and FDI. In addition, a positive relationship exists between FDI and growth. Furthermore, analysis from available empirical literature indicates that it may not be possible on *a priori* grounds to arrive at any firm conclusion on the directional causality between the variables. The issue is basically empirical and critical depends on the type and nature of an economy being considered. The next chapter provides an overview of inflation, FDI and growth in Ghana over the study period.

## CHAPTER THREE

# OVERVIEW OF INFLATION, FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN GHANA

### 3.1 Introduction

This chapter provides review of inflation, foreign direct investment and economic growth in Ghana development from 1980 to 2011. It discusses the historical trends of inflation, FDI and growth. This is followed by a summary and a conclusion of the various issues considered.

### 3.2 Trend of inflation

Before independence, inflation was very low in the then Gold Coast. According to Sowa and Mckay (2000), the average rate of inflation was below 1%. However, after independence, Nkrumah government pursued rapid modernization and development of import substitution industries and infrastructure which started building inflationary pressures in the economy (Aryeetey and Fosu, 2005).

In the early 1980s, Ghana experienced very high and volatile rates of inflation. Various reasons have been assigned for this notable trend .The then government pursued expansionary economic management, which led to huge balance of payment deficits. These deficits were financed through expansionary monetary policy, which resulted in excessive money supply growth and the subsequent effects on the economy through high general price levels. Furthermore, there was also a rapid depreciation of the cedi against major trading currencies and external shocks on the economy. In 1983, there was a drought with low agricultural production. Between 1980 and

1983, inflation averaged about 73.2% (Marbuah, 2011). Inflation hit its all time high figure of 122.8% in 1983, the highest since independence. This resulted from the intensive drought and bush fires which destroyed large quantities of food crops in 1983 thereby creating acute food shortage in the country. The situation was further worsened by the influx of Ghanaians from Nigeria in the same period. All these exerted upward pressures on demand for goods and services and on general price levels. The year 1983 also witnessed an exchange rate overvaluation as well as the development of a buoyant parallel market coupled with other inappropriate policies all of which are contributory factors to the inflationary pressures at the time (Aryeetey, et al. 2000; Fosu, 2003 and Akoena, et al. 2007).

By 1983, when inflation was out of control and the entire economy was near collapse, the government at that time adopted the economic recovery programme (ERP) which was proposed by the International Monetary Fund (IMF), with the aim of stabilizing the economy. The ERP sought to deal with external and imbalances that had crippled the economy and steer it onto a path of sustainable growth. Policy measures adopted included large exchange rate corrections, price deregulation, trade liberalization, financial sector reforms and rehabilitation of economic and social infrastructure. Under the ERP, efforts were also made to reduce budgetary deficits in order to control inflation, which was a major key under the programme. Within a year of the ERP, inflation dropped significantly to 39.7% in 1984 and further fell to 10.3% in 1985. The low rate attained in 1985 was due to the good harvest in 1984. Food prices constitute about 50%-60% of the CPI. An increase in food production exerted downward pressure on food prices and as a result the rate of inflation dropped for the period (Aryeetey, et al. 2000; Fosu, 2003 and Akoena, et al. 2007).

However, this achievement somehow fizzled out as inflation loosed its chains and jumped to about 40% in 1987. Actually, 1987 recorded the highest level of inflation within the decade following the launch of the ERP in 1987. Over the period 1980-1989, inflation had risen to an average height of 48.3% with 25.2% recorded at the end of 1989. Though the ERP achieved some amount of success in terms of reducing inflation rates and generally a limited amount of stability in the economy, the rates of inflation were still high compared with those achieved in the immediate period after independence.

In 1990, inflation rose again to 37.3% and fell in the subsequent year to 18%. The economy recovered marginally in 1992. Due to stringent fiscal and monetary controls, inflation gradually dropped to 10.06% in 1992. The same year witnessed the return to democratic rule in Ghana, which seems to be suitable for Ghana. The average inflation in the first three years of democracy was 19% (Jebuni et al., 1994). However, this recovery did not last long. Substantial government expenditure increases in 1992 (an election year) prior to the elections which contributed significantly to inflation rates surging from 10.06% in 1992 to 25% in 1993 and then to 59.5% by 1995, the highest since the inception of the ERP. The high rate of inflation in 1995 could also be explained by the introduction of the Value Added Tax (VAT) by the NDC government which received severe criticisms by a wide spectrum of Ghanaians. The new tax scheme, VAT resulted in prices skyrocketing because the VAT rate was even higher than the existing tax rate, that is, the Sales Tax, which it came to replace. Inflation however, declined continuously between 1996 and 1999 falling from 46.6% in 1996 to 12.4% at end of 1999. Unfortunately, this decline could not be sustained as the year 2000 ended with disappointing results on inflation. The year-on-year inflation had increased to 40.5%. This was due to the expansionary monetary policies pursued, the depreciation of the domestic currency which stood at 49.5%, the terms of trade shocks, the

general loss in confidence in the Ghanaian economy and the extensive borrowing from the Central Bank in 2000 probably to finance the election (Marbuah, 2011). As at the end of the first quarter of the year 2001, inflation had increased to 41.9% from 40.5% as at the end of December 2000. This was due to the excessive money supply growth in the last quarter of 2000, rundown of local food stocks and the upward adjustment in petroleum prices in February 2001. However, through prudent fiscal management and tight monetary policies coupled with a relatively stable cedi, government was able to reduce the year-on-year inflation from 40.5% as at the end of December 2000 to 21.3% as at the end of December 2001, representing a 19.2% decline. This was below the target of 25% set for the end of 2001, the first time an actual inflation rate fell below the target. The inflationary trend of the last quarter of 2002 could be explained by the payment for cocoa purchases that helped pushed the reserve money growth rate to 42.6% (Marbuah, 2011).

The economy suffered some bouts of high inflation in 2002-2003. Factors which accounted for this were related to external shocks, unsustainable macroeconomic policies and exchange rate depreciation. Year-on-year inflation was 23.6% at the end of 2003. Increases in petroleum products were the main factors that drove the consumer price index. Given that Ghana is susceptible to severe supply shocks from weather and commodity prices, the recent trends in inflation can best be described as commendable or relatively stable (Marbuah, 2011).

The year 2004 was an election year and a very challenging one for the monetary authorities in view of the history of excessive fiscal deficits accumulated through expansionary monetary policy that give rise to price increases and exchange rate volatility in the run-up to elections. However, due to prudent monetary management by the Bank of Ghana and the then government, coupled with improved prices in the non-food component of the CPI, led to a decline in inflation

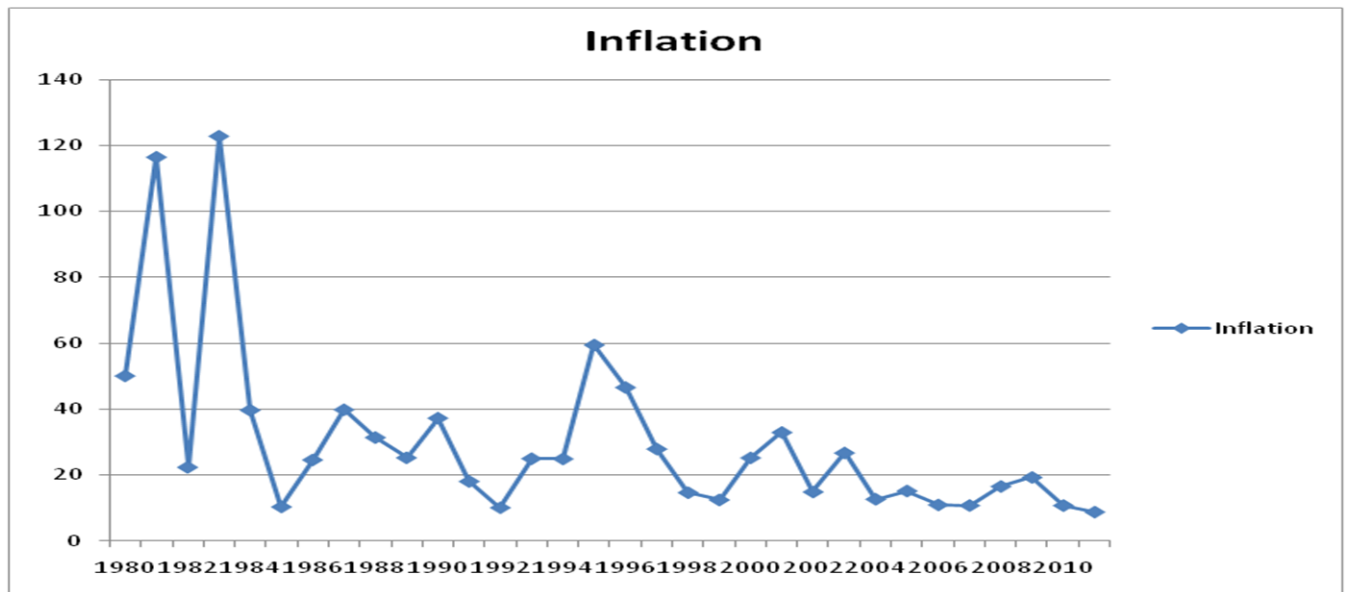
to 11.8%, a further miss of the single digit target. There was also exchange rate stability coupled with a decline in the prime rate which was introduced by the government in 2002 to replace the bank rate. This reflected in a fall in interest rates which boosted investments and the overall output in the economy. A period of disinflation began somewhere in 2004 that brought inflation down to near 10.9% in 2006, where it roughly stabilized until late 2007. End-of-year average inflation rate stood at 10.7%. Factors which contributed to this trend include among others the use of resources from debt relief and debt cancellation from the HIPC and Multilateral Debt Relief Initiative (MDRI), new aid flows and external loans and inward private transfers (including remittances) by the central bank to “buyoff” the otherwise accelerated rates of inflation in the economy (CEPA, 2009). The trend could also be attributed to the inflation targeting (IT) framework the Bank of Ghana has adopted which until after the second quarter of 2008 had well anchored inflationary expectations in its new monetary policy agenda of maintaining price stability.

The disinflationary process between 2001 and 2007 suffered a major setback due to external shocks following the high food prices and global financial crisis, fiscal dominance from excessive government expenditure (46.5% of GDP against total revenue shortfall of 31.3% of GDP) with a resultant fiscal deficit of 13.9% of GDP and exchange rate depreciation. The soaring rate continued and registered 19.25% at the end of 2009. The economy has sustained a downward trend for eighteen (18) months consecutively since June 2009. With a rate of 20.74% in June, 2009, the downward inflationary trend continued into single digits ending the year 2010 at 8.0%.

The trend has however reversed since January 2011, rising from 9.08% to 9.16% as at February

2011 on account of the recent 30% hikes in utility and fuel prices in the economy. However, the annual inflation for the year was 8.7% (Marbuah, 2011). However, it is noteworthy to indicate that the decadal analysis reveals a consistent downward trend in average inflation rates from a peak of 48.3% (1980-1989) to 27.6% (1990-1999) and finally 18.5% (2000-2009). The highest annual average inflation rate (48.3%) calculated over the period 1980-1989 recorded a growth rate of only 2.0% over the same period.

**Figure1: Annual trend of inflation in Ghana**



**Source: Author's computation from WDI, 2012.**

Figure 1 shows that there are two distinctive characteristics about the annual trend of inflation in Ghana. The first relates to its cyclical nature and the second is that it has observable episodes of peaks (1981, 1983 and 1995), troughs (1982, 1985 and 1999) and a range of moderate inflation rates (2004-2011). Thus inflation in Ghana, between 1980 and 2011 revolved around a cyclical and downward trend, and was basically caused by a combination of monetary and demand pressures, which were further exacerbated by external pressures.

### **3.3 Trend of Foreign Direct Investment**

When Rawlings first seized power in 1979, he adopted a radical and anti-business stance; growth fell to -3.2% and an FDI inflow of \$2.8 million in 1981. The state of the economy witnessed a further negative growth rate of 3.5% in 1981 to 6.9% in 1982 in the year of his second advent; however, net inflow of FDI remained constant at \$16.3 million (Tsikata et al, 2004).

In 1983, the Government of Ghana initiated the Economic Recovery Programme (ERP) and later Structural Adjustment Programme (SAP). These policies were adopted primarily to reverse the post independence economic decline, reduce the impact of the 1980 debt crisis and, facilitate the attraction of value-added FDI inflows to Ghana. The ERP has been described as being generally successful at stimulating more FDI inflow through the lowering of inflation, the removal of tariff barrier which were greater impediments to FDI inflow and the abolishing of exchange rate controls. (Aryeetey, et al. 2000; Fosu, 2003 and Akoena, et al. 2007).

Since the advent of the Economic Recovery Programme (ERP) in 1983, three historical phases of FDI flows in Ghana can be distinguished (Tsikata et al. 2000). The first period which spans from 1983 to 1988 had a sluggish FDI net inflows, averaging US\$4.2 million per annum, and the highest and lowest inflows during the period being US\$5.6 million in 1984 and US \$2.0 million in 1985 respectively. The high FDI inflow in 1985 was as a result of the establishment of a new investment code (PNDCL 116) that was to serve as the central Investment promotion Agency. Under this investment code were several incentives including tax holidays, exemption for import duties on capital and accelerated depreciation allowances. The second period which starts from 1989 to 1992 also recorded moderate inflows averaging US\$18.1 million per annum with the

highest and lowest inflows being US\$22.5 million in 1992 and US\$14.8 million in 1990, respectively.

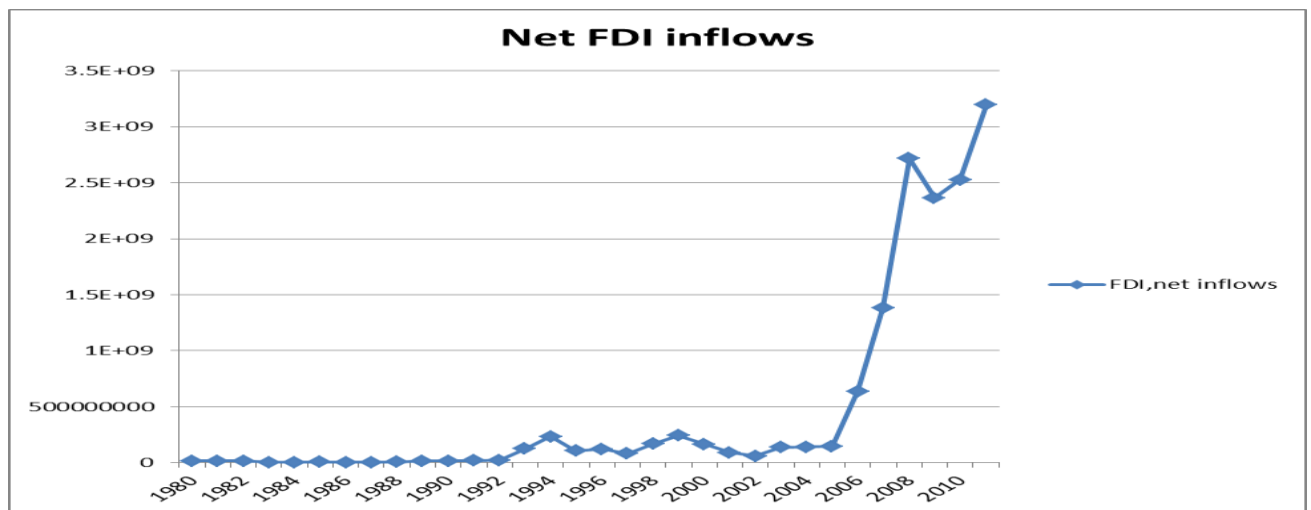
In addition, the period 1993 to 1996 witnessed significant (remaining in three digits) and oscillatory FDI net inflows, which reached a peak of US\$233 million in 1994 (with the privatization of Ashanti Goldfields Company AGC), but dropped to US\$106.5 million in 1995 before coming back to US\$120 million in 1996. The peak inflow in 1994 was due to revision of the investment code which ultimately led to the passing of the GIPC Act, 1994 (Act 478). The government also established the Ghana Investment Promotion Council (GIPC) to not only encourage and promote investment in the country but also to coordinate investment in the country. The Gateway project was also initiated, along with all its incentives to make the country attractive to foreign investors. Furthermore, in 1994 the investment code was reviewed to improve the investment climate through:

1. The gradual but effective removal of administrative and some other bottlenecks that hindered the flow of private investment.
2. A review of the tax system to take into consideration the private sector investment by reducing the tax to 45% maximum by 1997 for some enterprises.
3. The establishment of retention accounts and foreign accounts for some companies in order to ensure that part of their profits are retained in the country to finance importation of essential spare parts, raw materials and machinery.
4. The enhancement of credit expansion in 1987 and 1988 to ensure that there was adequate finance to support the priority sectors of the economy.
5. The liberalization of the financial system.

1997-2003 saw flows oscillating, decreasing from US\$81.8 million in 1997 to US\$56 million in 1998 (the lowest over the 1993-2003 period), then peaking at US\$267 million in 1999 before falling to US\$115 million the following year. FDI dropped further to US\$89 million and US\$50 million, respectively, in 2001 and 2002 owing to the effect of the September 2001 attack on the United States and the consequent global FDI drop of 41% in 2001 and 21% in 2002( UNCTAD, 2003). In 2003, the FDI recovery to US\$137 million was due to a massive boost in FDI with the merger of Ashanti Goldfields and AngloGold and the beginning of a US\$400 million gold mine investment by the US firm, Newmont.

The period 2004 to 2011 also witnessed significant and increasing FDI net inflows, which reached a peak of US\$3.2 billion in 2011 with the privatization of Ashanti Goldfields Company, but dropped to US\$106.5 million in 1995 before coming back to US\$120 million in 1996.

**Figure 2: Annual trend of FDI inflows in Ghana**



**Source: Author's computation from WDI, 2012.**

Figure 2 above shows that from 1980 to 1992, FDI inflow was sluggish, oscillated from 1993 to 2003 and increased sharply from 2004 to 2011. Thus, from 1980 to 2011, Foreign direct

investment inflows in Ghana generally follow an upward trend reflecting the decline in inflation and an upward real GDP growth trend.

### **3.4 Trend of Economic Growth**

Ghana is the first African country in sub-Saharan Africa to gain independence. After independence, there have been a huge number of national developmental plans designed to ensure sustainable and accelerated economic growth. At independence, Ghana was regarded as one of the better-placed developing countries and its level of economic development was comparable to Thailand and South Korea. Average incomes were higher than Nigeria, Egypt and India. There was also an absence of balance of payments deficits, a sound budgetary situation and a well-functioning public administrative system (Fosu, 2003 and Akoaena, et al. 2007).

However the distinct political instability gave way to poor economic conditions. Specifically, the economic decline was to a greater extent caused by excessive public spending on unproductive sectors of the economy which led to large fiscal deficits financed by monetary expansion, heavy government intervention through administrative control of prices, distribution and import controls and massive expansion of the public sector. External factors which led to the economic decline included the severe drought in the early 1980s, decline in international commodity prices of traditional exports, repatriation of about one million Ghanaians from Nigeria, high interest rates on international financial markets, price hikes in the early 1980s and political instability (Aryeetey, et al. 2000; Fosu, 2003 and Akoaena, et al. 2007). It was therefore not strange that for the first time in post-independence history of Ghana, the economy actually recorded an average negative growth rate (-3.6%) between 1980 and 1983.

In 1983, the Government of Ghana initiated the Economic Recovery Programme (ERP) and later the Structural Adjustment Programme (SAP) as the first in a series of strategies, aimed at revamping the economy, with the support of the World Bank and International Monetary Fund (IMF). These reforms in Ghana intended to introduce market based policies and the promotion of the private sector as the engine of sustainable economic growth. Among the most important measures that were adopted included exchange rate liberalization, fiscal discipline, tightening of monetary policy, foreign trade reforms, financial sector reforms, privatization of state-owned enterprises, investment expansion, price deregulation and labour market reforms (1990; Aryeetey, et al. 2000; Fosu, 2003 and Akoena, et al. 2007). Following the ERP in 1983, the economy grew from -4.6% in 1983 to an impressive 8.6% in 1984. The economy has since shown consistent growth rates above the 4% level over the period 1984-1999.

In the early 1990s, the government was committed to continuing the policies of the ERP. New agreements were concluded with the World Bank to continue credit arrangements on condition that Ghana reviews and revises its various economic laws and regulations, and support private sector development. In particular, the government agreed to revise or to repeal existing laws and regulations, affecting private investment that undermines the spirit of deregulation, economic liberalization, and exchange rate reforms. The government also agreed to develop and to strengthen the institutional framework that would facilitate private investment. Key priorities for the year 1992 and afterward included giving new impetus to state enterprise reform, broadening the scope of the banking-sector reforms, liberalizing the administrative framework, and strengthening public-sector management. Basic education and primary health-care services were to receive attention over the long term as well (Sowa, 2002).

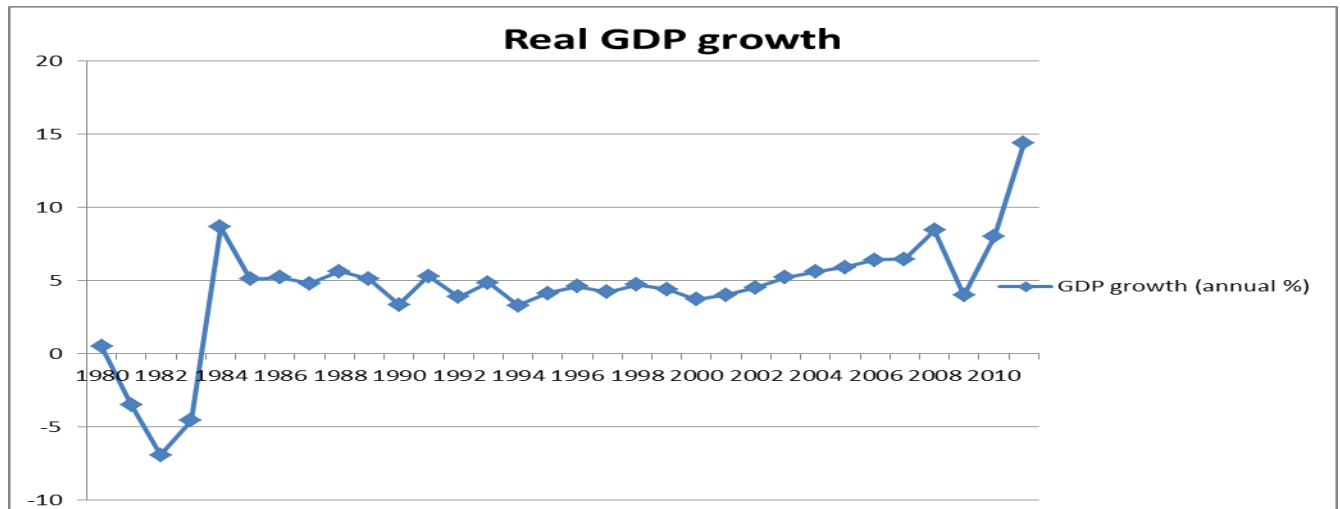
However, in 1992, 1993, 1996 and latter half of 1999, there was lackluster performance of the Ghanaian economy and occasional fiscal slippages. The crises in these years resulted from poor macroeconomic management, particularly through interruption by political unrest in connection with national elections, fiscal indiscipline (high government spending in pre-election period) and adverse external economic conditions (low cocoa and gold prices and high oil prices). Inflation accelerated, interest rates became unbearably high and the exchange rate depreciated rapidly. Large fiscal imbalances persisted, causing government to borrow more from the domestic economy, thus crowding out the private sector. The fiscal excesses have led to the rapid build-up of domestic debt, but large inflows of external aid continued. This helped to lubricate the economic machinery at a time when many facets of the Ghanaian economy had stopped. However, by the beginning of 2000, Ghana's domestic debt had swelled to almost 20 percent of national output, with interest payments more than the national expenditure on health and education combined. The total government domestic debt was attributed to inefficient operation of some state agencies like Tema oil refinery, Ghana National Petroleum Corporation as well as the local government units. An interest payment on the debt alone is more than a third of the national recurrent expenditure and certainly more than the development expenditure (IMF and World Bank, 2001). In addition Ghana had the statutory obligation of servicing its external debt. In that same year (2000), the stagnating growth was worsened by a downturn in the price of the country's major exports and crude oil price shocks. As a result real output growth declined to 3.7% and macroeconomic risk worsened (Databank Economic Analyst monthly Report, March 24, 2009).

The current account-induced balance of payments difficulties intensified in 2001, leaving the country's foreign exchange market badly distorted. The cedi underwent huge depreciation with

variable impact on different economic groups. The impact was most severe on firms producing for domestic markets and those engaged in pure commerce. Export-oriented firms, on the other hand, perhaps on account of their foreign exchange retention entitlements and privileges, seemed to have fared better. In the final analysis, the inflationary situation in the country got worse (Sowa, 2002). The large and persistent fiscal and external gaps created heavy debt burden that could not be sustained in the early 2000s. Consequently, Ghana had no recourse but to seek debt relief under the HIPC initiative in 2001 which led to significant debt reliefs. By 2006, Ghana's public debt as a percentage of GDP declined to 41% from an estimated 198% of GDP in 2000.

However, financing of energy infrastructure and the 50<sup>th</sup> Anniversary Celebration in 2007, as well as hosting of the African Cup of Nations among others, pushed public debt up to 56% of GDP by the end of 2008. By 2004, Ghana had received a total debt relief of approximately \$3.5 billion. This led to improvement in real output growth since 2001, with sustained increases from 4.0% in 2001 to 8.4% in 2008 (Databank Economic Analyst monthly Report, 2009). It however contracted in the 2009 fiscal year hitting a low of 4.0%. However, real GDP growth increased to 14.4% in 2011 as show in figure 2 below. The highest growth rate was recorded in 2000-2009 at 5.3% with an average inflation of 18.5%.

**Figure 3: Annual trend of real GDP growth**



**Source: Author's computation from WDI, 2012**

Figure 3 shows. Between 1980 and 1982, the real GDP growth follows a downward trend. The economy grew sharply in 1983 following the introduction of the ERP in 1983. However, the economic growth path since 2000 has also been rising steadily reflecting the decline in inflation.

### 3.5 Conclusion

The chapter dealt with a review of inflation, foreign direct investment and real GDP growth in Ghana from 1980-2011. Inflation revolved around a cyclical and declining trend. The economic growth path since 2000 has also been rising steadily reflecting the decline in inflation. Finally, the decline in inflation also had a corresponding increasing foreign direction investment inflow in Ghana. Thus, as inflation declined within 1980 to 2011, FDI and growth increases within the same period. The next chapter presents the econometric models for the study.

## **CHAPTER FOUR**

### **METHODOLOGY**

#### **4.1 Introduction**

This chapter presents the analytical framework for the study. Among the issues discussed are the theoretical and empirical models for investigating the long term relationship and causality between inflation, FDI and growth and the estimation techniques. Finally, concluding remarks are provided.

#### **4.1 Theoretical framework**

The discussions in chapter two revealed that the theoretical models that explain the inflation, foreign direct investment and economic growth nexus end up with mixed conclusions. The Keynesian model explains that there is an initial positive relationship between inflation and growth, which later turns negative. Within the neoclassical framework, inflation can have positive or negative effect on growth. Furthermore, the endogenous growth theories also found that inflation negatively affects FDI and economic growth. Finally, the new growth model also explains that both FDI and economic growth relate positively and leads to bidirectional causality. Thus, the question about which of the models perfectly holds for the Ghana economic therefore becomes an empirical one.

In light of this, the Vector Autoregressive (VAR) technique is used to model the causal relationship between inflation, FDI and growth. The benefit of the VAR approach is that, it does not entail any strict economic theory within which the model is grounded. Furthermore, the

usage of the VAR approach helps to account for endogeneity between inflation, FDI and growth which could lead to spurious regression.

## 4.2 Empirical Models

To explore the relationship between inflation, FDI and growth, the study uses the Bound Test Method developed by Pesaran and Shin (1999) and additionally extended by Pesaran, Shin and Smith (2001). This procedure is adopted because it is simple as opposed to other multivariate cointegration techniques such as the Johansen and Juselius (1990). The Bound Test allows the cointegration relationship to be estimated by OLS once the lag order of the model is identified. This approach is applicable regardless of whether the underlying regressors are purely stationary, purely integrated or mutually integrated. On the other hand, the Johansen and Julius approach to cointegration does not have good small sample properties and inevitably require a certain degree of pre-testing which further introduces another degree of uncertainty into the analysis (Pesaran et al., 2001). In addition, the Bound approach is considered essential as evidence of cointegrating relationship rules out the possibility of spurious regression. Another interesting fact about this model is that it can estimate long- run and short- run components of model simultaneously (Narayan and Narayan, 2006).

Furthermore, instead of imposing restrictions and deciding on the dependent variable, the Bound Test method distinguishes between dependent and independent variable through the usual F-tests. Moreover, as noted by Narayan (2004), the unrestricted equilibrium correction model is likely to have superior statistical properties compared to Engle-Granger method, as it does not push short- run dynamics into the residual terms (Pattichis 1999; Banerjee *et al.*, 1993; Banerjee *et al.*, 1998). Thus, the superiority of the bound test approach to cointegration in terms of

producing efficient results for a relatively small sample study like this is assured. The method by Pesaran et al. (2001) necessitates the use of an Autoregressive Distributed Lag (ARDL) model to specify an Unrestricted Error Correction Model. This is therefore attained by first modeling a long-run general Vector Autoregressive generating process of order  $p$  as follows:

$$Z_t = \alpha_0 + At + \sum_{i=1}^p \Gamma \Delta + \varepsilon_t \dots\dots\dots (1)$$

Where:

- $z_t$  is the vector of variables INF, FDI and GDP (with INF, FDI and GDP, whenever being used as a dependent variable, restricted to a variable integrated of order zero and when used as an independent variable, restricted to variables integrated of order zero or one).
- $A$  denotes a  $(k+1)$ -vector of trend coefficients.
- $\varepsilon_t$  is an error term
- $\Gamma$  is another  $(K+1)(K+1)$  vector of short run coefficients

Furthermore, following Pesaran et al., (2001) the following vector equilibrium correction model (VECM) which contains the long-run multipliers and short-run dynamic coefficients of the VECM is specified as:

$$\Delta Z_t = \alpha_0 + At + \lambda Z_{t-1} + \sum_{i=1}^p \Gamma \Delta + \varepsilon_t \dots\dots\dots (2)$$

Where:

- $\Delta$  is the first difference operator.
- $\lambda$  is the long-run multiplier matrix which is defined as:

$$\lambda = \begin{bmatrix} \lambda_{YY} & \lambda_{YX} \\ \lambda_{XY} & \lambda_{XX} \end{bmatrix}$$

Since the diagonal elements of the matrix are unrestricted, then the selected series can be either integrated of order zero or integrated of order one. When  $\lambda_{YY} = 0$ , then  $Y$  is integrated of order one. However, when  $\lambda_{YY} < 0$ , then  $Y$  is integrated of order zero.

Pesaran et al. (2001) assumed that the intercepts are unrestricted and that there are also no trends. Assuming, there is the existence of a unique long- run relationship between INF, FDI and GDP and imposing the restrictions  $\lambda_{YY} = 0, \mu \neq 0$  and  $\alpha = 0$  the ARDL (p,q, r) UECM can be specified as:

$$\text{INF}_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta \text{INF}_{t-i} + \sum_{i=1}^q \beta_{1i} \Delta \text{FDI}_{t-i} + \sum_{i=1}^r \gamma_{1i} \Delta \text{GDP}_{t-i} + \lambda_1 \text{INF}_{t-1} + \beta_2 \text{FDI}_{t-1} + \lambda_3 \text{GDP}_{t-1} + \varepsilon_{1t} \dots \dots \dots (3)$$

$$\text{FDI}_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta \text{INF}_{t-i} + \sum_{i=1}^q \beta_{1i} \Delta \text{FDI}_{t-i} + \sum_{i=1}^r \gamma_{1i} \Delta \text{GDP}_{t-i} + \lambda_1 \text{INF}_{t-1} + \beta_2 \text{FDI}_{t-1} + \lambda_3 \text{GDP}_{t-1} + \varepsilon_{1t} \dots \dots \dots (4)$$

$$\text{GDP}_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta \text{INF}_{t-i} + \sum_{i=1}^q \beta_{1i} \Delta \text{FDI}_{t-i} + \sum_{i=1}^r \gamma_{1i} \Delta \text{GDP}_{t-i} + \lambda_1 \text{INF}_{t-1} + \beta_2 \text{FDI}_{t-1} + \lambda_3 \text{GDP}_{t-1} + \varepsilon_{1t} \dots \dots \dots (5)$$

In the equations above,

- INF is the first difference of the log of consumer price index
- FDI is the first difference of the log of foreign direct investment
- GDP is the first difference of the log of real gross domestic product
- $\alpha, \beta, \gamma, \lambda$  are parameters to be estimated
- $\varepsilon$  is an error term

Equations 3, 4 and 5 above indicate that inflation, foreign direct investment and economic growth tend to be influenced and explained by their past values. The optimal lag lengths are established by using either the minimum AIC or SIC. There are 3 steps in testing the cointegration relationship between INF, FDI and GDP. First, we estimate equations 3, 4 and 5 above by ordinary least square (OLS) technique. By restricting the estimated coefficients of the lagged level variables from equations 3, 4 and 5 to zero, the long run relationship between inflation, foreign direct investment and economic growth can be established. The presence of cointegration can be traced by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. This is achieved by testing the following hypothesis:

$H_0: \lambda_1 = \beta_1 = \gamma_1 = 0$  (no long-run relationship) against the alternative

$H_1: \lambda_1 \neq \beta_1 \neq \gamma_1 \neq 0$  (a long-run relationship exists)

The computed  $F$ -statistic value will be compared to the critical values generated by Pesaran et al., (2001). According to these authors, the lower bound critical values assumed that the explanatory variables  $x_t$  are integrated of order zero, or  $I(0)$ , while the upper bound critical values assumed that  $x_t$  are integrated of order one, or  $I(1)$ .

If the computed  $F$ -statistic is less than the lower bound critical value, then we do not reject the null hypothesis and conclude that there is no cointegration between the variables. Conversely, if the computed  $F$ -statistic is greater than upper bound critical value, then we reject the null hypothesis and conclude that there exists a long-run equilibrium relationship between the

variables under study. However, if the computed F - value falls within lower and upper bound critical values, then the result is inconclusive.

With the second step, once cointegration has been established consequent upon which a unique long -run relationship exists among variables of interest, and then the long term relationships can be estimated from the following sets of equations.

$$INF_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta INF_{t-1} + \sum_{i=1}^q \beta_{1i} \Delta FDI_{t-1} + \sum_{i=1}^r \gamma_{1i} \Delta GDP_{t-1} + \varepsilon_t \dots\dots\dots (6)$$

$$FDI_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta INF_{t-1} + \sum_{i=1}^q \beta_{1i} \Delta FDI_{t-1} + \sum_{i=1}^r \gamma_{1i} \Delta GDP_{t-1} + \varepsilon_t \dots\dots\dots (7)$$

$$GDP_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta INF_{t-1} + \sum_{i=1}^q \beta_{1i} \Delta FDI_{t-1} + \sum_{i=1}^r \gamma_{1i} \Delta GDP_{t-1} + \varepsilon_t \dots\dots\dots (8)$$

Finally, the short-run dynamic coefficients are obtained by estimating an error correction model associated with the long run estimates. This is specified as follows:

$$\Delta INF_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta INF_{t-1} + \sum_{i=1}^q \beta_{1i} \Delta FDI_{t-1} + \sum_{i=1}^r \gamma_{1i} \Delta Y_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \dots\dots\dots (9)$$

$$\Delta FDI_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta INF_{t-1} + \sum_{i=1}^q \beta_{1i} \Delta FDI_{t-1} + \sum_{i=1}^r \gamma_{1i} \Delta Y_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \dots\dots\dots (10)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^p \lambda_{1i} \Delta INF_{t-1} + \sum_{i=1}^q \beta_{1i} \Delta FDI_{t-1} + \sum_{i=1}^r \gamma_{1i} \Delta Y_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \dots\dots\dots (11)$$

Where,

- $ECM_{t-1}$  is the one period lagged error correction term.
- $\lambda$  is the speed of adjustment

The coefficient  $\lambda$  measures the speed of adjustment to obtain equilibrium in the event of shocks to the system. General – to – Specific modeling technique of Hendry and Erricson (1991) is followed in selecting the preferred ECM. This procedure first estimate the ECM with different

lag lengths for the difference terms and, then, simplify the representation by eliminating the lags with insignificant parameters.

Furthermore, to investigate the directional causality between inflation, FDI and growth, the study employs the Toda and Yamomanto (1995) causality testing approach instead of the traditional Granger causality test and the Johansen and Jusulius (1990) alternative tests of non-causality. Although the traditional pair-wise Granger causality tests is more revealing than simple correlation coefficients, it abstracts from philosophical issues of causality by merely insisting on temporal precedence and predictive content as the necessary criteria for one variable to 'Granger cause' another.

Another shortcoming of the Granger causality test is that it is based on the asymptotic theory and therefore critical values are only valid for stationary variables that are not bound together in the long run by a cointegrating relationship (Granger, 1988). This makes the causality test results somewhat weak and conditional on the absence of cointegration between the relevant variables. In cointegrated systems, such tests are more complex, since the existence of unit roots gives various complications in statistical inferences. Thus there is a high risk of making wrong inferences about causality simply due to the incorrect identification of the order of integration of the series or number of cointegration vectors among the variables.

Not all, the Granger causality test is grounded on the assumption that the variables are stationary, or even if non-stationary have the same order of integration. However, the test may not be valid if the variables are non-stationary and or co integrated (Granger, 1969). In this case, stationary requirements dictate that the Granger causality test be performed on a regression in which the variables in their appropriate levels of difference are used. However, the difficulty with

differencing is that it sifts out the underlying long-run relationship between the variables (Darat, 1998).

In light of the aforementioned challenges associated with the traditional Granger causality test and the Engle and Granger (1969) and Johansen and Juselius (1990), this study employs the Toda and Yamomanto (1995) causality approach which is applicable irrespective of whether the underlying variables are stationary, integrated of an arbitrary order, or cointegrated of an arbitrary order (Toda and Yamamoto, 1995).

Essentially, the Toda and Yamomanto (1995) causality method involves the estimation of an augmented VAR ( $k+d_{max}$ ) model. The Granger no-causality test uses a modified Wald test for zero restrictions on the parameters of the original VAR ( $k$ ) model. The rest of the  $d_{max}$  autoregressive parameters are considered as zeros and disregarded in the VAR( $k$ ) model. This test has an asymptotic  $\chi^2$  distribution when the augmented VAR ( $k + d_{max}$ ) is estimated (Oteng and Frimpong, 2006). The tests for Granger no-causality experience efficiency improvement when Seemingly Unrelated Regression (SUR) models are used in the estimation. Moreover, the modified Wald test statistic is also easily computed in the SUR system (Rambaldi and Doran (1996).

Following the analogy of Toda and Yamamoto (1995) and from equation (1) the causality between inflation, foreign direct investment and economic growth can be tested by the following VARs:

$$\ln INF_t = \alpha_0 + \sum_{i=1}^{k+d_{max}} \lambda_{1i} \ln INF_{t-1} + \sum_{j=k+1}^{k+d_{max}} \beta_{1j} \ln FDI_{t-1} + \sum_{i=1}^{k+d_{max}} \gamma_{1i} \ln Y_{t-1} + \varepsilon_t \dots \dots \dots (12)$$

$$\ln FDI_t = \alpha_0 + \sum_{i=1}^{k+d_{max}} \lambda_{1i} \ln INF_{t-1} + \sum_{j=K+1}^{k+d_{max}} \beta_{1i} \ln FDI_{t-1} + \sum_{i=1}^{k+d_{max}} \gamma_{1i} \ln Y_{t-1} + \varepsilon_t \dots \dots \dots (13)$$

$$\ln GDP_t = \alpha_0 + \sum_{i=1}^{k+d_{max}} \lambda_{1i} \ln INF_{t-1} + \sum_{j=K+1}^{k+d_{max}} \beta_{1i} \ln FDI_{t-1} + \sum_{i=1}^{k+d_{max}} \gamma_{1i} \ln Y_{t-1} + \varepsilon_t \dots \dots \dots (14)$$

4)

Where,

- k is the optimal lag length in the original VAR system,
- dmax is the maximal order of integration of the variables in the VAR system
- lnINF is the log of consumer price index (CPI), which is expected to have a negative sign
- lnFDI is the log of net foreign direct investment inflows, which is expected to have a positive sign
- lnGDP is the log of real GDP growth, which is expected to have a positive sign
- $\lambda, \beta, \gamma$  are parameters to be determined
- $\varepsilon_t$  is an error term

From the Wald statistic, the null that FDI and Y do not cause INF can be established from equation (12) by the hypothesis below:

$$H_0: \beta_{1i} = \gamma_{1i} = 0$$

Also, the null that INF and GDP do not cause FDI can be ascertained from equation (13) by testing the hypothesis below:

$$H_0: \lambda_{1i} = \gamma_{1i} = 0$$

Finally, the null that inflation and foreign direct investment do not cause growth can be established from equation (14) by the following hypothesis below

$$H_0: \lambda_{li} = \beta_{li} = 0$$

### 4.3 Stationary Test

Studies that involve time series analysis normally use historical data to establish relationships between variables in order to forecast the future. In cases, where the future happens to be different from the past, then those relationships may not be appropriate in forecasting. This often occurs when the variables are non-stationary and contain unit root. Therefore, variables that are used for time series studies have to follow a stochastic process and be stationary.

A stochastic process for a variable  $y_t$  is said to be stationary if its mean and co-variance are time invariant. If the variables are not stationary, then estimation may lead to spurious results which have no economic meaning.

The study uses the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test to test for stationarity in the variables.

The ADF test employs the following model to check for unit root in variables:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_t \sum_{i=1}^m \Delta y_{t-i} + \varepsilon_t \dots \dots \dots 15$$

Where,

- $Y_t$  is the variable in question.
- $t$  is a time trend.
- $\Delta$  is the difference operator.

- $\varepsilon_t$  is a white noise process.

Using equation 15, the below hypothesis is tested for stationary.

$H_0: \delta=0$  ( $y_t$  is non- stationary)

$H_1: \delta < 0$  ( $y_t$  is stationary)

Dickey and Fuller used  $\tau$ -statistic instead of the t-statistic which they proved to be inappropriate.

If the calculated  $\tau$ -statistic is less than the critical values generated by MacKinnon (1996), the null hypothesis is rejected and the alternate hypothesis that the variable is stationary is accepted.

The study also employs the Phillips-Perron (PP) test as an alternative to confirm the results of the ADF test which is unreliable in the presence of structural breaks. Perron (1989) shows that the ADF test cannot reject the null hypothesis of non-stationarity if the true data generating process was stationary around a trend function that is subject to exogenous shocks. The PP test also involves comparing a PP test statistic with the critical values by MacKinnon (1996) to conclude on the null hypothesis. This test unlike the ADF test employs a correction factor that calculates the variance of the error process using the Newey-West formula.

#### **4.4 Testing for Lag structure**

According to Eiders (1995) the selection of an appropriate lag length is as significant as determining the variables to be included in any system of equations. A model that has a fairly large number of lags has the tendency to generate residuals that approach the white noise process, but might not also be parsimonious. On the other hand when the lag length is small, the

model is likely to be parsimonious, but might not generate residuals that are random enough to approach a white noise process. The aforementioned problems therefore calls for the need to select an optimal lag length to avoid misspecification and lost of degrees of freedom.

The study jointly employs the Akaike Information Criteria (AIC) and the Schwartz Bayesian Information Criteria (SIC) to choose the appropriate optimal lag lengths of the variables that produce errors that approach a white noise process.

#### **4.5 Estimation Techniques**

From the unrestricted error correction model, if a cointegration relationship is established, then the long run relationship can be further obtained by using Ordinary Least Squares (OLS). Also, the causality between inflation, foreign direct investment and growth will be determined by estimating level VARs by the Seemingly Unrelated Regression (SUR) technique. With this technique, a Wald test can be conducted for the null of no cointegration on appropriate coefficients.

#### **4.6 Data**

The study employs secondary data. Time series annual data on inflation, foreign direct investment and real GDP growth from Ghana over the study period 1980 to 2011 are used for the study. Data was obtained from World Development indicators (2012).

Inflation for this study is measured by the first difference of the log of the consumer price index. Inflation is expected to have a negative relationship with foreign direct investment and economic growth. Foreign direct investment is measured by the first difference of the log of net FDI

inflows. Since FDI boosts the growth of GDP, the study expects FDI to be positively related to growth. Finally, economic growth is measured by the first difference of the log of real per GDP growth. Growth is expected to relate positively with FDI and negatively with inflation.

#### **4.7 Conclusion**

Varied theoretical literature explained the linkage between inflation, FDI and growth. Following these linkages, the study used a trivariate ARDL model and a trivariate VAR model to examine the causal link between inflation, FDI and growth in Ghana. Also the study discussed how the ADF and PP unit root test are used to assess the stationarity of the variables under study. In addition, the study used the AIC and SBC information criterions to select the optimal lag lengths. The next chapter therefore deals with the estimation and discussions of findings.

## CHAPTER FIVE

### RESULTS AND DISCUSSION

#### 5.1 Introduction

In the previous chapter, two econometric models; ARDL (trivariate) and a trivariate VAR were identified to aid in examining the linkages between inflation, FDI and economic growth. Also, two econometric techniques; the cointegration approach by Pesaran et al., (2001) and the causality testing procedure by Toda and Yamomanto (1995) were suggested for the estimation process, given the current developments within econometric research.

This chapter therefore presents the results when the aforementioned econometric techniques were used to empirically examine the links between inflation, FDI and economic development in Ghana (1980-2011). The chapter is presented in five sections. The first two sections provide the descriptive statistics and results of unit roots tests respectively. The third section provides the results of the Bound Test of cointegration. The fourth section considers the findings of the Toda-Yamamoto tests for causality. The fifth section concludes the chapter as a whole.

## 5.2 Descriptive Statistics

**Table 5.1: Summary Statistics of the Variables, 1980—2011**

	GDP	FDI	INFLATION
Mean	4.348	2.289	30.093
Median	4.747	1.459	24.717
Maximum	14.389	9.516	122.874
Minimum	-6.923	0.045	8.726
Std. Dev.	3.826	2.807	26.757
Skewness	-0.846	1.484	2.409
Kurtosis	5.821	4.021	8.589
Jarque-Bera	14.439	13.137	72.628
Probability	0.001	0.001	0.000
Sum	139.159	73.259	962.983
Sum Sq. Dev.	453.986	244.388	22194.200
Observations	32	32	32

**Source:** Author's computation from WDI, 2012.

Over the period under study, GDP growth averaged 4.35%. By a developing country standard, this figure is considered moderate. The rate of flow of foreign direct investment into Ghana was on the average 2.29%. Inflation, on the other hand, averaged 30.09% over this period. The average rate of inflation was very high. This might have accounted for the moderate growth of GDP and foreign direct investment.

The maximum growth rate of GDP was 14.39%, while the minimum was -6.92%. The maximum flow of foreign direct investment into Ghana was 9.52, while the minimum was about 0.05. The maximum inflation rate over the entire period was 122.87% as against the minimum of 8.73%.

The skewness of GDP growth of -0.85 implies that low levels of GDP dominated high levels. Foreign direct investment was positively skewed, meaning that FDI flow into the country has been on the rise. Inflation was also positively skewed, with a skewness of 2.41; this means that there were many years of high level of inflation than years with low level of inflation. The Jarque-Bera for GDP, FDI, and Inflation showed that the data was not normally distributed; that is, the null hypothesis that the variables are not normally distributed was rejected.

### 5.3 Unit Root Tests

The stationarity characteristics of the variables were tested by the ADF and PP procedures and the results are presented in Table 5. 2.

**Table 5.2: Test for Unit Root in the Variables at their Log Levels**

Variable	ADF		PP	
	t-statistic	p-value	Adj. t-statistic	p-value
LnGDP	-0.111	0.937	-2.398	0.151
lnINF	-3.852	0.430	-3.751	0.546
lnFDI	-0.832	0.795	-0.759	0.817

\*Mackinnon (1996) one-sided p-values

These tests were carried out simultaneously to ensure the variables enter their corresponding models in a non explosive form and are robust. Also, they were carried out to ensure that the variables under investigation satisfy the preconditions for the econometric techniques adopted for the study. The variables were tested in their log levels. The ADF and PP tests accepted the existence of unit roots in the variables in their log levels since all the probabilities are more than 5%. This means that the variables are non-stationary. Non-stationary variables are not very useful in economics. The only exception is when their linear combination makes them stationary or when they are cointegrated. The establishment of relationships is very important in macroeconomic analysis, therefore when variables are non-stationary, they tend to produce unrelated regressions or spurious relationships. An important step to making non-stationary variables stationary is by differencing them. The variables were tested in their first difference to see whether they contain unit roots, using the same ADF and PP procedures. The results of the ADF and PP tests are presented Table 5. 3.

**Table 5.3: Test for Unit Root in the Variables at their Log Difference**

Variable	ADF		PP	
	t-statistic	p-value	Adj. t-statistic	p-value
D(lnGDP)	-8.314**	0.003	-7.826**	0.000
D(lnINF)	7.013**	0.013	-3.458**	0.016
D(lnFDI)	-5.100**	0.000	-5.181**	0.000

**Source:** Estimated from Microfit 4.0

\*Mackinnon (1996) one-sided p-values \*\*implies rejection of the null hypothesis at 5% level of significance.

The results show that the logs of GDP, FDI, and Inflation do not contain unit roots at their first differences since all the probabilities are less than 5%. This means that the variables are stationary in their first differences. This way, when a regression is run on these variables, no spurious outcomes are expected. In other words, the variables are integrated of order one—they are I(1) processes.

Based on the above findings, the precondition for the cointegration test by Pesasaran et al.(2001) is satisfied for the first difference of the logs of GDP, FDI and inflation as dependent variables. On the other hand, all variables satisfy the Toda and Yamomanto causality testing procedure, since none of them are integrated of an order two or more. Based on these results, we use the first difference of the logs of the variables of GDP, FDI and inflation for estimation.

#### **5.4 Tests for Cointegration**

The first difference of the logs of the variables of GDP, FDI and inflation were used for the cointegration test. The cointegration test is performed basically to ascertain whether long run relationships exist between inflation, FDI and GDP. The results of the Bounds test are presented in Table 4.

**Table 5.4: Bound Test for Cointegration**

Dependent Variable	F-statistic	5%		10%	
		I(0)	I(1)	I(0)	I(1)
	For Three Variables				
D(lnGDP)	30.238 <sup>(***)</sup>	3.470	4.450	4.010	5.070
D(lnINF)	15.420 <sup>(***)</sup>	3.470	4.450	4.010	5.070
D(lnFDI)	10.035 <sup>(***)</sup>	3.470	4.450	4.010	5.070

<sup>(\*)\*\*</sup> implies that the null hypothesis of no cointegration is rejected at 5% and 10%, respectfully.

The F-statistic estimated for all the three equations is greater than the upper bounds at 5% and 10%. The null hypothesis of no cointegration is rejected for all three equations. This means that these variables are cointegrated. That is, all three variables namely, DlnGDP, DlnFDI, and DlnINF converge to long run equilibrium path when they deviate from it in the short run.

Once, cointegration has been established, the long run and short-run relationships are estimated using equations 6 to 11 as indicated in chapter four. The results are presented below.

**Table 5.5: Estimated long-run coefficients for model1**

DLNINF		
Repressor	Coefficient	Probability
DLNFDI	-0.233	0.027**
DLNGDP	-0.050	0.041**

Source: Estimated using Microfit 4.0.

\*\* means significant at 5% confidence level

The results show that FDI has a negative and statistically significant effect on inflation in Ghana. Table 5.5 reveals that, a 1% increase in FDI leads to 0.233 % decrease in inflation in Ghana. The results also show that growth has a negative and statistically significant effect on inflation. As seen from table 5.5, a 1% increase in growth leads to 0.05% decrease in inflation.

**Table 5.5.1: Error Correction Model 1**

DLNINF		
Repressor	Coefficient	Probability
DLNFDI	-0.256	0.076*****
DLNGDP	-0.308	0.272***
ECM(-1)	-1.47	0.000*

Source: Microfit 4.0.\* means significant at 1% confidence level. \*\*\* means significant at 10% confidence level. \*\*\*\*\* means not significant at 10% confidence level

The results show that FDI has a negative and statistically significant effect on inflation in the short- run. Thus, a 1% increase in FDI leads to 0.256 % decrease in inflation in Ghana. The results further show that growth has a negative and statistically insignificant effect on inflation. When the economy grows by 1%, it leads to 0.05% decrease in inflation.

The long- run component of the model is given by the lagged error correction term, ECM (-1). From the results the ECM (-1) is correctly signed and significant. It means that the two variables DLNFDI and DLNGDP are indeed causally related with the dependent variable DLNINF through this error-correction term. A significant ECM(-1) coefficient means that all things being equal, whenever the actual value of DLNINF falls below the value consistent with its long-term equilibrium relationship, changes in the independent variables help bring it up to the long term equilibrium value. The size of the coefficient indicates that the speed of adjustment to equilibrium (whenever there is an imbalance) is 147%. This is an explosive speed of adjustment to long run equilibrium.

**Table 5.6: Estimated long-run coefficients for model 2**

DLNFDI		
Repressor	Coefficient	Probability
DLNINF	-1.94	0.034**
DLNGDP	1.42	0.012*****

Source: Estimated using Microfit 4.0

\*\* Means significant at 5% confidence level

The results show that inflation has a negative and statistically significant effect on the net FDI inflows in Ghana. When inflation increases by 1% FDI decreases by 1.94%. The empirical works by Udoh and Egwaikhide (2008), Ade et al.,(2011) and Djokoto( 2012) are confirmed by this study. A direct import of this is that expansionary macroeconomic policy that increases, the general price levels will deter FDI in Ghana.

Furthermore, the results show that real GDP growth has a positive and statistically significant effect on FDI inflows in Ghana. Table 5.6 shows that when the economy grows by 1%, FDI inflows increases by 1.42%. This result is in line with the work of Edoumieku (2009) who discovered that growth positively impact FDI inflows in Nigeria but contradicts the work of Sackey et al.,(2013) who found that growth has no positive effect on FDI inflows in Ghana.

**Table 5.6.1: Error Correction Model 2**

DLNFDI		
Repressor	Coefficient	Probability
DLNINF	-0.553	0.030**
DLNGDP	0.404	0.276*****
ECM(-1)	-0.285	0.071***

Source: Estimated from Microfit 4.0

\*\* Means significant at 5% confidence level

\*\*\* means significant at 10% confidence level

\*\*\*\*\* means not significant at 10% confidence level

The results show that inflation has a negative and statistically significant effect on the FDI in the short- run. As seen from table 5.6.1, a 1% increase in inflation leads to 0.533% decrease in net FDI inflows in Ghana. Real GDP growth has a positive and statistically insignificant effect on FDI inflows in Ghana. When the economy grows by 1%, FDI inflows increase by 0.404%.

A significant  $Ecm(-1)$  coefficient means that all things being equal, whenever the actual value of  $DLNFDI$  falls below the value consistent with its long-term equilibrium relationship, changes in  $DLNINF$  and  $DLNGDP$  help bring it up to the long term equilibrium value. The size of the coefficient indicates that the speed of adjustment to equilibrium (whenever there is an imbalance) is about 28.5%. This is a moderate speed of adjustment to long run equilibrium.

**Table 5.7: Estimated long-run coefficients for model 3**

DLNGDP		
Repressor	Coefficient	Probability
DLNINF	-0.811	0.020**
DLNFDI	0.331	0.056***

Source: Estimated using Microfit 4.0

\*\* Means significant at 5% confidence level

\*\* Means significant at 10% confidence level

The results show that inflation has a negative and statistically significant effect on the growth of the Ghanaian economy. It means that a 1% decrease in inflation leads to 0.811% increase in real

GDP growth in Ghana. This is consistent with the study of Quartey (2010) who established an inverse relationship between inflation and growth in Ghana though it contradicts the work of Philip (2010) who found no relationship between inflation and growth in Nigeria.

In addition, the results indicate that FDI has a positive and statistically significant effect on the growth of the Ghanaian economy. As seen from table 5.7, a 1% increase in FDI leads to 0.331 % increase in growth. This result is in line with the work of Sackey et al., (2012) and Antwi et al., (2013) who discovered that FDI positively impact growth in Ghana. Also Chkwakwa et al., (2012) work on Nigeria shows that FDI is influential in the growth of the country.

**Table 5.7.1: Error Correction Model 3**

DLNGDP		
Repressor	Coefficient	Probability
DLNINF	-0.310	0.054***
DLNFDI	0.233	0.031**
ECM(-1)	-0.775	0.000

Source: Estimated using Microfit 4.0

\*\* Means significant at 5% confidence level

\*\*\* Means significant at 10% confidence level

The results show that inflation has a negative and statistically significant effect on the growth of the Ghanaian economy. When inflation increases by 1%, real GDP growth increases by 0.31%. Furthermore, the results reveal that FDI has a positive and statistically significant effect on the growth of the Ghanaian economy. As seen from table 5.7.1, a 1% increase in FDI leads to 0.233

% increase in growth in the short-run. This is consistent with Ramirez (2000) who established a positive relation between FDI and growth in Mexico in the short-term

The long run component of the model is given by the lagged error correction term, ECM (-1). From the results the ECM (-1) is correctly signed and significant. It means that the two variables DLNFDI and DLNINF are indeed causally related with the dependent variable DLNGDP through this error-correction term. A significant ECM(-1) coefficient means that all things being equal, whenever the actual value of DLNGDP falls below the value consistent with its long-term equilibrium relationship, changes in DLNFDI and DLNINF the independent variables help bring it up to the long term equilibrium value. The size of the coefficient indicates that the speed of adjustment to equilibrium (whenever there is an imbalance) is about 77.5%. This is high speed of adjustment to long run equilibrium. The high significant error term confirms the existence of a stable long-run relationship.

## 5.5 Tests for Causality

The final step in the analysis is to test the existence of causal relationships between inflation, FDI and growth using the Toda and Yamamoto (1995) procedure. This involves the addition of extra lags,  $d_{\max}$  (determined by the order of integration of the series) to the optimal lag length (K) to correctly specify level VARs. This is to basically control for potential cointegration. With the appropriate lags, equations 14 to 16 in chapter four are re-specified to individually reflect the level INF-FDI-GDP link in a parsimonious way. These equations were estimated by the seemingly unrelated regression technique.

As displayed in Table 3 above, all the variables are integrated of order one; that is, the three variables became stationary after differencing them once. The value of  $d_{\max}$  is, therefore, one.

The Schwarz Bayesian Criterion (SBC), and the Hannan-Quinn Criterion (HQ) chose an optimal lag of two to be included in the Seemingly Unrelated Regression (SUR) Model; that is,  $k$  was two. The choice of optimal lag to be included is presented in Table 8 below. Thus, the study employs three lags in the SUR estimation.

**Table 5. 8: Lag Selection Procedure**

Lag	LogL	LR	FPE	AIC	SBC	HQ
0	-68.94669	NA	0.041414	5.329384	5.473366	5.372198
1	-35.80112	56.47023	0.006969	3.540823	4.116751	3.712077
2	-28.1922	11.27247*	0.007959*	3.643867	4.651740*	3.943560*
3	-22.81491	6.771402	0.011215	3.912215	5.352034	4.340349
4	-6.662788	16.75035	0.007669	3.382429	5.254193	3.939002
5	5.769840	10.13029	0.007820	3.128160*	5.431870	3.813174

Note: \*indicates lag order selected by the criterion.

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

Finally, the study conducted coefficients restriction tests of the SUR model. Rambaldi and Doran (1996) have shown that the Modified Wald (MWald) test for Granger non-causality gains efficiency if Seemingly Unrelated Regression technique is used. The results of the Toda and Yamamoto causality test are presented in table 9.

**Table 5.9: Results of Toda and Yamamoto Causality Test**

Null Hypothesis	MWald Statistic	p-value
GDP does not cause FDI	4.34**	0.0164
FDI does not cause GDP	26.60**	0.0000
GDP does not cause INF	4.34**	0.0164
INF does not cause GDP	1.00	0.3723
FDI does not cause INF	26.60**	0.0000
INF does not cause FDI	1.00	0.3723

Note: \*\*means the null hypothesis is rejected at 5% level of significance.

For the GDP equation, the null hypothesis that the coefficients of the first lag and the second lag are jointly not different from zero was rejected at 5% level of significance. This means that there is a causal link flowing from economic growth to foreign direct investment; there is also a causal link flowing from economic growth to inflation.

The null hypothesis that the coefficients of the first lag and the second lag in the inflation equation are jointly zero was not rejected at 5% level of significance. This means that there is no causality flowing from inflation to economic growth; there is no also causality flowing from inflation to foreign direct investment.

The test of coefficient restriction on the foreign direct investment equation revealed that there is a causal link flowing from foreign direct investment to economic growth; it also revealed that there is a causal link flowing from foreign direct investment to inflation.

Basically, the Toda-Yamamoto test above revealed that there exists bidirectional causal relationship between economic growth and foreign direct investment. The study also finds that there is a unidirectional causality running from economic growth to inflation and that there is a unidirectional causality running from foreign direct investment to inflation in Ghana.

## **5.6 Conclusion**

The chapter sets to examine the relationships between economic growth, foreign direct investment, and inflation in Ghana. To do that, ADF and PP unit roots procedures were undertaken to establish the stationary properties of these variables. Both the ADF and PP established the existence of unit roots in the three variables. These variables were found to be integrated of order one, meaning that by differencing them once, they become stationary. The Bound test was employed to see whether the variables share any long run relationships, which was necessary considering they were integrated. The study found that the variables were cointegrated. In other words, these variables move together in the long run. The study concluded by examining the direction of causality between these variables. The findings were that there is bidirectional causality between economic growth and foreign direct investment; there is a unidirectional causality running from economic growth to inflation; and there is a unidirectional causality running from foreign direct investment to inflation.

## CHAPTER SIX

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Introduction

This chapter provides a general summary and conclusion for the study, as well as policy implications of the study.

#### 6.2 Summary of the Study

The worst inflationary episode in Ghana occurred between 1980 and 1983 with inflation hitting its apogee in 1983. This experience, among other things provoked serious policy reforms, which were initially enshrined in the Economic Recovery Programme, to deal with the high and volatile inflation in Ghana. The fight against inflation assumed greater momentum in 2007, when the Bank of Ghana formally adopted inflation targeting as monetary policy to ensure price stability in order to attract FDI to stimulate growth.

Meanwhile, there are no concrete empirical studies on the inflation, foreign direct investment and growth nexus in Ghana. Unfortunately, empirical studies on other countries also provide conflicting results. Secondly, most of these studies use bivariate VAR system, and such studies may suffer omission and misspecifications biases and as such their findings may be misleading.

This study therefore sought to investigate dynamic linkages between inflation, FDI and growth in Ghana using annual time series data over the period 1980 to 2011. To accomplish this, two dynamic econometric models; a trivariate VAR and a trivariate ARDL were specified. These

models were selected to suit the theoretical and empirical linkages established between inflation, FDI and economic growth and also to go well with the data for Ghana.

Similarly, two economic techniques; the cointegration approach by Pesaran Shin and Smith (2001) and the causality test by Toda and Yamomanto (1995) were engaged in estimating the aforementioned models. Inflation was computed as the first difference of the log of the consumer price index. Foreign direct investment was measured as the first difference of the log of net FDI inflows and economic growth was also measured as the first difference of the log of real GDP growth.

The Bound test to cointegration revealed that all the three variables; inflation, FDI and GDP converged to long run equilibrium path when they deviated from it in the short run. Inflation was found to negatively affect both FDI and GDP. However, FDI and GDP were found to be positively related. All relationships were statistically significant at the 5%

Finally, the Toda and Yamomanto causality test established bidirectional causality between FDI and growth and a unidirectional causality running from FDI to inflation. A unidirectional causality was found running from GDP to inflation. However, inflation had no causal linkage with FDI and growth.

### **6.3 Conclusions of the Study**

The first objective of the study was to ascertain if there are relationships between inflation, FDI and growth in Ghana over the period 1980 to 2011. It was discovered that there are significant relationships between inflation, foreign direct investment and economic growth in Ghana. The

relationship between inflation and foreign direct investment is negative. Inflation is also negatively linked to growth, whilst foreign direct investment has a positive relation with growth.

The second objective was to examine the causal links between inflation, FDI and growth. It was found out that there are directional causal links between inflation, FDI and growth. No directional causality was found from inflation to FDI and growth, suggesting that the past values of inflation do not significantly explain FDI and growth in Ghana. There is a unidirectional causality from FDI and growth to inflation, suggesting that the past values of FDI and growth significantly explain inflation. Finally, bidirectional causality was confirmed between FDI and growth implying that past values of these variables significantly explain each other.

#### **6.4 Recommendations**

Based on the above conclusions, the following policy recommendations are worth noting:

First, the negative relationship between inflation and economic growth means that high inflation may presents deleterious effects to growth in Ghana. However, higher level of output growth is very crucial to ensure price stability in Ghana because of the unidirectional causality running from real GDP growth to inflation. Therefore, for the fight against inflation to be won, policies should be geared towards addressing the real economic factors that hinder GDP growth in Ghana.

Secondly, the inverse relationship between inflation and FDI signifies that high inflation deters FDI in Ghana. However, price stability may not attract FDI because of the unidirectional causality from FDI to inflation. High FDI is central to low levels of inflation in Ghana. Therefore, both fiscal and monetary policies geared towards encouraging FDI in Ghana would

enable Ghana witness high and sustainable growth. A policy recommendation is to attract export-oriented FDI into the industrial sector and more especially agricultural sector of the economy since agriculture is the backbone of the Ghanaian economy. Government must also create the necessary environment to attract foreign direct investment into the economy. For instance, improvement in the transportation system and industry, provision of sustainable energy and water, waste management, improvement in communication technology, building and rehabilitation of ports and harbours must be encouraged since these facilities are important in attracting foreign direct investment into Ghana. It is therefore very important to pay increased attention to the overall role and the quality of growth as a vital determinant of FDI along with the quality of human capital

Future research in this area should analyze the causal linkage between inflation, FDI and growth in a multivariate VAR system to take account of other crucial determinants of these variables. This is likely to improve upon our results and may even provide more sturdy conclusions

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## APPENDICES

**Appendix I: Unrelated Regression (The estimation method converged after 0 iterations)**

Variable	Coefficients	Std. Error	t-Statistic	P-value	95% Confidence Interval	
<b>DlnGDP</b>						
DlnGDP(-1)	.3753021	.196052	1.91	0.059	-.0152534	.7658577
DlnGDP(-2)	.3608847	.1225332	2.95	0.004	.1167862	.6049833
DlnGDP(-3)	-.0479956	.0770743	-0.62	0.535	-.2015354	.1055443
Constant	.5326973	.4580771	1.16	0.249	-.379839	1.445234
<b>DlnINF</b>						
DlnINF(-1)	.2558107	.1809739	1.41	0.162	-.1047077	.6163291
DlnINF(-2)	-.0449462	.172129	-0.26	0.795	-.3878447	.2979522
DlnINF(-3)	.1169928	.1640041	0.71	0.478	-.2097201	.4437058
Constant	2.044753	.754119	2.71	0.008	.5424705	3.547035
<b>DlnFDI</b>						
DlnFDI(-1)	1.016706	.1851031	5.49	0.000	.6479617	1.38545
DlnFDI(-2)	-.1261533	.259062	-0.49	0.628	-.6422313	.3899248
DlnFDI(-3)	.0091699	.1901145	0.05	0.962	-.3695577	.3878974
Constant	.081227	.1381031	0.59	0.558	-.1938886	.3563425
Equation :	R <sup>2</sup> :	F-Statistic:		P-value:		
DlnGDP	.2907796	2.90		0.0406		
DlnINF	.6089467	5.91		0.0386		
DlnFDI	0.8238	42.87		0.0000		

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Source: Author's computation from Microfit 4.0

**THESIS DATA**

<b>YEARS</b>	<b>INFLATION</b>	<b>GDP GROWTH (ANNUAL %)</b>	<b>FDI,NET INFLOWS</b>
1980	50.07014	0.471696	15600000
1981	116.5036	-3.50307	16263752
1982	22.29557	-6.92365	16300000
1983	122.8745	-4.56374	2400000
1984	39.66531	8.647569	2000000
1985	10.30544	5.091618	5600000
1986	24.56542	5.19916	4300000
1987	39.81507	4.794899	4700000
1988	31.35927	5.62817	5000000
1989	25.22369	5.085873	15000000
1990	37.25907	3.328818	14800000
1991	18.03144	5.281826	20000000
1992	10.05612	3.879419	22500000
1993	24.95984	4.85	125000000
1994	24.87026	3.3	233000000
1995	59.46155	4.112419	107000000
1996	46.56102	4.602461	120000000
1997	27.88521	4.196358	81800000
1998	14.62417	4.700391	167000000
1999	12.40867	4.399997	244000000
2000	25.19322	3.7	166000000
2001	32.90541	4	89320000
2002	14.81624	4.5	58930000
2003	26.67495	5.2	137000000
2004	12.62457	5.6	139000000
2005	15.11819	5.900004	145000000
2006	10.91517	6.4	636000000
2007	10.73273	6.459736	1380000000
2008	16.52214	8.430504	2710000000
2009	19.25071	3.991473	2370000000
2010	10.70757	8.008593	2530000000
2011	8.726837	14.38915	3200000000