Modelling the causality between FDI and Zimbabwe's economic growth

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DECLARATION

Except for references specifically indicated in the text, and such help as has been acknowledged, this thesis is wholly my own work and has not been submitted to any other University or Higher Education Institution.

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ABSTRACT

The study investigates the causal nexus between economic growth and FDI in Zimbabwe for the period spanning 1976 to 2011. The bounds testing approach to cointegration and Granger causality methodology was applied and results suggest a bi-directional causal relationship between FDI and economic growth in the long run. However, the causal effect from economic growth to FDI was weak. Domestic investment, human capital and trade openness were also found to be crucial determinants of economic growth in Zimbabwe. Implementing policies that promote inflow of FDI into Zimbabwe are recommended.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Context of the Research

Foreign direct investment (FDI) has recently become an important policy topic in Zimbabwe on whether it can aid in reviving the economy. FDI refers to foreign individuals' or companies' investments into the economy through mergers and acquisitions, construction of new facilities and entities or expansion of existing operations (Hall and Jones, 2013:34). FDI plays an important role in facilitating access to larger amounts of development capital than might be locally available (Haddad and Harrison, 2007:22). Among other benefits, studies have shown that FDI into a country creates employment for locals, improves the level of technology through technology transfers that enhances labour productivity, improves infrastructure and key economic enablers through the development of transport and communication networks, water and sanitation facilities, energy generation and social amenities like housing development (Balasubramanyam, Salisu and Dapsoford, 2008; Borensztein, De Gregorio and Lee, 2011:94). As a result, the cumulative impact of FDI is an increase in GDP through increasing gross investment in the economy (UNCTAD, 1999:1). On the other hand, the negative effects of FDI can be exchange rate fluctuations and volatility of GDP caused by shocks introduced by variations in FDI and repatriation of profits back to the home country (Lall, 1995:7).

Most countries that have managed to attract a reasonable amount of FDI have managed, to some extent, to achieve economic growth (Borensztein, De Gregorio and Lee, 2011:56). Existing evidence shows that in the period 2009-2014, Zambia attracted average annual FDI flows of US$1.1 billion which saw the country expanding at a 5-year compounded annual GDP growth rate of 6.8% (Calderon *et al*, 2009; Heritage, 2014:24). Over the same period, Botswana with an average annual FDI flows of $297 billion also recorded a comparatively significant 5-year compounded annual GDP growth of 2.7% (Calderon *et al*, 2009:78).

Although FDI is argued to be critical in achieving economic growth, developing economies find it difficult to attract sufficient amounts to stimulate economy wide real activities. Haddad and Harrison (2007:24) noted that there are a number of demand side determinants that host countries should improve on in order to increase FDI flows. They argued that host countries need to respect property rights and uphold the rule of law. On the other hand, it is argued that the low rates of savings and investment prevalent in developing countries, which translate to minimal rates of economic growth, make them unattractive for FDI (McConnell and Brue, 2005:170). In this case, economic growth causes FDI and not *vice versa*.

If the neoclassical economic growth theory hypothesis that capital, labour and technology are the primary factors of economic growth is anything to go by, then FDI in its various forms is critical to augment the low rates of savings and investment, less skilled labour and obsolete technology prevalent in developing countries. Although FDI is presumed to have a level effect on output under neoclassical economic theory (Solow, 1956:78), the endogenous growth theory postulates that FDI has long run growth effect through technological spillover effects (Romer, 1986: 1016-1020; Romer, 1993: 143-144). It therefore, can be argued that against a backdrop of constrained commercial loans and growing donor fatigue, FDI could be the source of long term economic growth for developing countries (Aitken and Harrison, 1999:1). Literature has shown that FDI into the production sector through mergers and acquisitions, construction of new facilities and entities or expansion of existing operations significantly drives economic growth in developing countries (IMF, 2009; World Bank, 2011:1). Like most developing countries, Zimbabwe is also experiencing low rates of savings and investment, and outdated technology. Thus, this study seeks to investigate whether FDI augments domestic resources to try and achieve economic growth in Zimbabwe.

Vo and Batten (2006: 98) have shown that the greatest growth impact of FDI is realized when the host country has the necessary absorption capacity such as the right level of education, infrastructure and appropriate policy mix. Trade openness and a higher quality of labour in an economy have also been pointed as critical channels through which FDI impact an economy (Farkas, 2012: 10 and Borensztein *et al*, 1998: 123). Without such prerequisites FDI may have a neutral growth effect.

Conflicting empirical evidence on the impact of FDI on host country's economy have also been noted. Maliwa and Nyambe (2015:15) found that there is no causality between FDI and GDP in Zambia, whilst, Alhkasawneh (2013: 1771) established a unidirectional causality running from FDI to economic growth in the State of Qatar. Moyo (2013:35) using linear regression found that FDI is positively related to GDP in Zimbabwe. Asghar *et al* (2012: 90-93) found that FDI has a neutral effect on economic growth in India, Maldives, Indonesia, China, Philippines, South Korea Dem and Singapore. Thus, the nexus between FDI and host country's economy can be undirectional, bidirectional or neutral. There is a possibility that growing economies mean effective demand and a large market, thus they might attract FDI. It is also likely that economies that are in decline experience FDI flight. Yet, FDI also drives economic growth by complementing domestic investment/savings.

The established role of FDI in Zimbabwe, by Moyo's (2013:35) study is highly questionable. The study is based on OLS correlation regression analysis. Although the study established that FDI is positively related to economic growth in Zimbabwe, it is not known whether FDI causes Zimbabwe's economic growth. Moyo's (2013) analysis spanned a very short period from 2009 to 2012. The study did not show the sample size and it is not clear whether he used monthly or quarterly data. In this regard, this study seeks to investigate the causal relationships between economic growth and FDI in Zimbabwe. The period of analysis is extended to cover 1976 to 2011 using yearly data. This study controlled for factors considered in literature to provide a conduit through which FDI affect economic growth indirectly and these include domestic investment, trade openness, and human capita stock.

Since Zimbabwe's independence in 1980, FDI, on average, has accounted for slightly less than 5% of gross investment (Trading Economics, 2014). In recognition of its importance to economic growth, Zimbabwe's 2011 Medium Term Plan projected FDI to be the major driver of economic growth and was expected to contribute around 25% to the Gross Domestic Product by 2015. In the quest to implement the right pro-investment policy, the Government 2of Zimbabwe has so far implemented various pro-investment macroeconomic policy frameworks including the Economic Structural Adjustment Programme in the period 1990-1995; Zimbabwe Programme for Economic and Social Transformation in 1996; Medium Term Economic Recovery Plan in 1998; Short Term Emergency Recovery Plan in 2009; Medium Term Plan in 2011; and Zimbabwe Agenda for Sustainable Socio-Economic Transformation in 2013. In addition, the country's fiscal and monetary policy statements issued at various intervals have all made significant consideration of investment promotion (RBZ, 2013; Ministry of Finance, 2009). Unfortunately, during the past decade, limited success in attracting FDI was registered largely due to the deteriorating Doing Business Index rating, policy inconsistency and mixed reactions to the land reform as well as the economic empowerment and indigenization policy.

The Economic Structural Adjustment Programme (ESAP), which was adopted to foster the creation of a market friendly environment, resulted in the establishment of the Zimbabwe Investment Centre (ZIC) in 1994, now renamed the Zimbabwe Investment Authority (ZIA). The ZIA was further designed as a one stop shop (OSS) in 2010 for the quick processing of investment applications through a single window facility for investors into Zimbabwe. As a result, there was an improvement in FDI flows into the country from US$2.8 million in 1991 to about US$117.7 million in 1995. Inward FDI flows reached USD444.8 million in 1998, which was the highest for the country since independence. Due to the economic decline, the period 1999-2008, in which inflation reached 231 million percent in July 2008 (Zimstat, 2008), witnessed low FDI levels into the country, averaging between US$3.8 million and US$102.8 million. Following the introduction of the multicurrency system in 2009 and economic stability, there was an increase in FDI flows into the country averaging between US$105 million and US$400 million during the period 2009–2013. In October 2014, the International Monetary Fund predicted that Zimbabwe's foreign direct investment would remain steady at 2% of GDP in 2015 (IMF, 2014:75).

In the period 1980-2000, FDI into Zimbabwe had been predominantly directed into agriculture and mining. However, from 2000 to 2015, the country seems to have experienced structural changes in the FDI pattern in which the tertiary sector has attracted increasing levels of FDI particularly following further pronouncement of the country's Indigenisation and Economic Empowerment Legislation in 2009 (Hall and Jones, 2013:43). The Indigenisation and Economic Empowerment Legislation stipulates that at least 51% of shareholding in foreign owned companies be in the hands of locals. However, the empowerment legislation has not yet been harmonized with other pro-investment initiatives including bilateral and multilateral investment promotion and protection agreements (RBZ, 2011:27).

The major sources of FDI into Zimbabwe in the pre-2000 period were Western countries particularly the United States of America and the European Union (IMF, 2014:34). However, in recent years the main sources of FDI into Zimbabwe are the emerging markets especially China, Mauritius and South Africa, following the implementation of the land reform programme that saw the adoption of the Look East Policy by the Zimbabwean government (Anderson, 2010:52).

Since the adoption of the multicurrency regime Zimbabwe's real GDP grew by 5.4% in 2009; 11.4% in 2010; 11.9% in 2011; 10.6% in 2012; and is estimated to have grown by 3.4% in 2013 (Ministry of Finance and Economic Development, 2013). Partly due to weak inflows of external capital both private and public investment, GDP growth in 2014 was expected to be at a revised 3.1% from an initial projection of 6.1% as the country's growth momentum continued to decline (Ministry of Finance, 2014). The country, in 2013, developed an economic blue print that is hoped to reverse the above growth trend; unfortunately about 70% of the expenditure on projects is expected to be funded by development partners whose focus is mostly on humanitarian interventions in education, health and food security (Zim Asset Prioritised Annual Plan, 2015).

From a policy perspective, Zimbabwe, under the multicurrency regime is very constrained to undertake its developmental state role in the quest to turn around the falling trend of GDP growth. Unlike other developing countries that are using their currency, Zimbabwe is limited in the extent to which it can manipulate its monetary and the exchange rate policy to stimulate industrial productive activities. Without the ability to print money coupled with a shrinking tax base as companies are closing down, the fiscal policy is heavily constrained. Furthermore, the country has external debt which is approximately US$11 billion. The implication is that Zimbabwe has difficulties in accessing new credits lines much needed to recapitalize the industrial sector. Therefore, debt capital is not currently a viable option to finance Zimbabwe's industrial sector. Equity investments and FDI seem to be attractive sources of financing real sector activities in Zimbabwe. On this background, this study seeks to investigate whether harnessing FDI can cause economic growth in Zimbabwe.

1.2 Goals of the Research

Whilst Moyo's (2013) study was focused on correlation analysis without any interrogation of whether there is a causal relationship or that the relationship is either short or long run, this study aims to investigate the causal nexus between FDI and Zimbabwe's economic growth. Specifically the study will:

1. Investigate whether there is a long run relationship between FDI and GDP; and

2. Assess whether there is a causal relationship between GDP and FDI flows in Zimbabwe.

1.3 Methods, Procedures and Techniques

Following Maliwa and Nyambe (2015), this study investigated the causal relationship between Zimbabwe's economy and FDI in a multivariate specification. The Bounds testing approach to cointegration and Granger causality technique were employed in data analysis.

1.4 Research Design

A research design is a plan, strategy and structure that a research takes to obtain data to answer research questions (Haase and Myers, 1988:134). This study made use of a causal comparative or *ex post facto* research design that explores cause and effect relationships where causes already exist and cannot be manipulated. The adoption of the design is in line with the historical nature of the movements in FDI since 1976 in Zimbabwe and the resultant impact on GDP over the same period.

1.5 Data and Data Collection Methods

The study used secondary data spanning the period 1976 to 2011. The period was chosen as it is the period with accurate statistics available. The researcher accessed the data on a yearly basis principally from international data sources that include Pen World Tables, World Bank and World Development Indicators. Other secondary sources of data used were journals and other databases available through the internet.

1.6 Data Presentation and Analysis

Data analysis was carried out using Eviews software.

1.7 Organization of study

Chapter 1 introduces the study. This is followed by Chapter 2 which reviews literature on the relationship between FDI and economic growth. The Methodology is presented in Chapter 3. Estimation and presentation of result is the main object of Chapter 4, and Chapter 5 concludes the paper by providing a discussion of the results and policy implications.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Understanding the channels that link economic growth and foreign direct investment forms the basis for modelling the causality between them. This Chapter endeavours to review analytical frameworks underlying the debate on the role of FDI in economic growth. The Chapter first reviews economic growth theories that include the Harrod-Domar model, the neoclassical growth theory and the endogenous growth theory. Empirical literature on the causality between FDI and economic growth will be reviewed next. The predictions from literature review will serve as the foundation for assessing the causality between FDI and economic growth in Zimbabwe.

2.2 Theoretical literature review

There are many theories of economic growth that have been put forward. This section only the reviews Harrod-Domar model, the neoclassical growth theory and the endogenous growth theory.

2.2.1 The Harrod-Domar Model

The theory postulates that capital accumulation through savings and investments results in economic growth. According to Snowdon and Vane (2005:598-600), the Harrod-Domar model relates the growth rate of an economy to its stock of capital and productivity of investment as follows:

$$\psi = \frac{s}{v} - \sigma \qquad \text{...} (1)$$

Where ψ is the economic growth rate, $v = K_t / Y_t$ is capital-output ratio, s is the rate of savings, σ is the capital rate of depreciation, K_t and Y_t are capital stock and total output of the economy, respectively (Snowdon and Vane, 2005;600).

Equation 1 shows two sources of economic growth. Firstly, increasing the savings rate will lead to economic growth and secondly, increasing the productivity of investment, v, will increase the growth rate.

The Harrod-Domar model, though no longer popular in economic literature, is still widely used by international financial institutions such as World Bank and IMF to make growth and financing gap forecasts for developing countries (Easterly, 1999: 4). Financing gap is the difference between investments required and the savings available. Developing countries are mostly found to have wide financing gaps and, thus, these gaps are usually filled by either overseas development aid (ODA) or FDI (Ali, 2014:19). Fosu and Magnus (2006: 2079) argued that there is a growing mismatch between domestic investment requirements for economic growth and available domestic savings in developing countries and thus identified FDI as a critical source of capital to augment domestic savings/investments to achieve economic growth. Serbu (2008: 113), Sghaier and Abida (2013: 1) and Ali (2014: 19-20) also acknowledged that developing countries are mostly in short supply of investment funding and therefore FDI plays a central role in closing the gap between domestic investments needs and domestic saving. Considering the role of FDI in complimenting domestic savings, Ali (2014:19) extended Equation 1 to include foreign direct investment as follows:

$$\psi = \frac{(s+f)}{v} - \sigma \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(2)}$$

Where f is FDI inflows.

Equation 2 relates the growth rate of the economy to the savings rate, capital-output ratio, the FDI accumulation rate and the rate of depreciation of capital. The higher the savings and FDI inflows, the lower the capital-output ratio and the rate of depreciation of capital the higher will be the economic growth rate. Thus, in the Harrod-Domar model, capital accumulation through increasing savings and FDI will lead to economic growth.

From Equation 2 it is observed that to increase the economic growth rate, FDI must complement and not compete with domestic savings/investment. The complementarity condition rules out the possibility of crowding out of domestic capital by FDI (De Mello, 1999: 136). Therefore, it can be concluded that the Harrod-Domar model postulates a positive relationship between FDI and economic growth and that causality is expected to run from FDI to economic growth in developing countries like Zimbabwe that have wide financing gaps.

In the Harrod-Domar model, FDI is a source to build up the host country's capital stock. However, if we consider the effects of depreciation, FDI will not have a perpetual effect on economic growth. Thus, though accumulation of capital stimulates economic growth, its effects will only be in the short run due to diminishing marginal returns of capital. It is then suggestive that something else is needed to explain long run economic growth (Easterly and Levine, 2001: 5).

Economic growth effects in the Harrod-Domar model are often distinguished into two: firstly growth comes from capital accumulation and secondly it comes from the quality of investment as measured by the capital output ratio (Easterly, 1999: 8). The capital output ratio measures the productivity of the investment and reducing the $v = {K_t}/{Y_t}$ is equivalent to producing more with less investment. $v = {K_t}/{Y_t}$ is the amount of investment required to produce a unit of output, thus reducing the quantity of investment required to produce a unit of output imply that the economy is highly productive. High quality investments use less capital to produce a unit of output thus reducing the ratio with the resultant increase in the economic growth rate.

Development of financial markets is argued to be one of key factors that determine whether investments in an economy are of high quality. Developed financial markets form a pool of investable funds that can be used by financial intermediaries to invest in information search which enables them to screen projects, efficiently allocate investable funds and monitor high risk projects with high return while minimising cost associated with information asymmetry (Sghaier and Abida, 2013:3). The productivity of investment as captured by $v = {K_t}/{Y_t}$ in the Harrod-Domar model is likely to increase its impact on economic growth in the presence of developed financial markets. By analogy, the impact of FDI on economic growth as postulated by the Harrod-Domar model depends on both the quantity and quality of FDI and that the quality effect of FDI on growth is dependent on availability of some threshold of financial development.

The above review has revealed that FDI is critical in supplementing domestic investments in developing countries. Thus, if FDI competes with domestic capital it may not result in economic growth. Furthermore, it is argued that FDI has both efficiency effect and investment effect on economic growth (Sghaier and Abida, 2013:8). The efficiency effect is likely to depend on the availability of some level of financial development (Farkas, 2012: 4-5).

2.2.2 Solow's neoclassical growth model

Solow extended the Harrod-Domar model by adding labour as a variable that explains economic growth (Ali, 2014: 20). Using a neoclassical production function, Solow (1956: 66), hypothesises that economic growth results from accumulation of physical capital, labour and exogenous technological development. Solow's economic growth model is generally specified as follows:

$$Y_t = f(K_t; L_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where Y_t is output, L_t is labour and K_t is the capital stock of the economy (Solow, 1956: 66).

In the Solow's model, accumulation of capital and labour are the sources of economic growth. He assumed that labour grows proportional to the population growth rate "n" such that $L_t = L_0 e^{nt}$. Capital evolution is then dependent on savings from output. Part of the total output of the economy is consumed and the remainder is saved and invested, thus savings equal investment and are given by sY_t, where s is the saving rate. Thus, according to Solow (1956: 67) the building up of the capital stock over time can be given by $\dot{k} = sY_t = sf\left(K_{t;} L_t\right)$ which is expressed as:

$$\dot{k} = sf\left(K_t; L_0 e^{nt}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where $\dot{k}$ is a period's net capital accumulation, K_t is capital stock at time t and $L_o e^{nt} = L_t$ which is labour at time t (Solow, 1956: 67).

Equation 4 gives the present period net capital accumulation and adding this to the existing stock of capital gives the next period available capital stock (Serbu, 2008:113).

At any level of technology, the more capital per worker is, the more output growth per worker is and to achieve this condition, often referred to as capital deepening, the rate of capital growth must exceed that of labour. However, the influence of successive additions to capital per worker on output will decline due to diminishing returns. Thus, an increase in capital per worker where capital is scarce is expected to have higher positive impact on output than it would where capital is in abundance (Snowdon and Vane, 2005: 605). Given the established fact in literature that developing countries are capital scarce (Fosu and Magnus, 2006: 2079; Serbu, 2008: 113; Sghaier and Abida, 2013: 1; and Ali, 2014: 19-20), it is expected that capital will flow into developing countries from capital rich developed countries due to higher expected returns on investment in developing countries (Snowdon and Vane, 2005: 605) *ceteris paribus*.

In Solow's neoclassical model of economic growth, FDI also plays the role of adding to the host country's stock of capital. De Mello (1999: 136) argued that in the presence of FDI, physical capital in the host country is a combination of domestic and foreign owned capital. This is further supported by Findlay (1978) in Khaliq and Noy (2007: 4) who extended Solow's model by distinguishing capital input into foreign and domestic inputs and argues that increase in foreign capital increases the accumulation of total capital stock in the domestic country. Under the neoclassical growth framework, FDI is assumed to have a direct impact on economic growth. Kotrajaras (2010: 15) argued that when FDI is assumed to cause economic growth directly the capital stock in Solow's model can be decomposed into domestic capital and foreign capital as shown in the following equation:

$$Y_t = f\left(K_{dt}; K_{ft}; L_t\right) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(5)}$$

Where K_{dt} is domestic capital and K_{ft} is foreign capital (Kotrajaras, 2010: 15).

Equation 5 is shows that FDI has a direct impact on economic growth and an increase in the quantity of FDI will lead to an increase in economic growth. However, this impact on growth is expected to be temporary due to diminishing returns to capital, consequently FDI has no capacity to sustain long run economic growth (Serbu, 2008: 113; 118). Easterly and Levine (2001: 5) concluded that it is not the accumulation of capital that explains long run economic growth, but the total factor productivity is what matters when they observed that factor accumulation was persistent whilst economic growth has not been continual across countries.

Solow (1956: 85-86) demonstrated that long run economic growth is possible in the presence of technological progress. He provided a model specified as follows:

$$Y_t = A_t f\left(K_t; L_t\right) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(6)}$$

Where A_t is a time increasing scale factor representing technological change (Solow, 1956: 85).

Technological change is ever increasing thus it augments the impact of labour and capital on economic growth through countering the effects of diminishing returns on factor productivity and thus achieving long run economic growth. Technological growth is assumed to shift the output curve upwards and cause an everlasting impact on economic growth. Although it is noted that technological development leads to long run economic growth, sources of changes in the technology parameter are considered exogenous, and hence Solow's technology cannot be taken as a decision variable for policy making.

2.2.3 Endogenous growth theory

Explaining long run economic growth requires a theory that explains the evolution of technology as a decision variable. The endogenous growth theory becomes an appealing option as it explains how technological growth occurs in response to deliberate actions of economic agents. Romer (1986:1016-1020) developed a model in which technological progress is a function of economic agents' action. His model is specified with technology as a policy variable as follows:

$$Y_t = f\left(A; K_t; L_t\right) \qquad \text{...} (7)$$

Where Y_t is total economic output, A_t is the stock of knowledge, K_t is capital stock, and L_t is labour (Romer, 1986: 1016-1020).

He proposes that investment in research results in generation of new knowledge that will add to the existing stock of knowledge and can be used to produce more output. Equation 7 is assumed to be characterised by increasing returns to scale because marginal productivity of knowledge is ever increasing and that it counters the diminishing marginal returns of capital, therefore the model is able to explain long-run economic growth (Romer, 1986: 1020). Romer's (1986) main contribution is that technology is an endogenous variable and it results from economic agents' deliberate actions of investing in research. This is supported by, Aghion and Howitt (1992: 349) who argued that technology growth evolves from investment in research. They developed a model of economic growth in which growth is a function of technological progress, capital and labour. The only difference with Romer's (1986) model is that they emphasised on industrial innovation that improves product quality. They reasoned that firms are motivated to invest in research by high expected returns guaranteed by patenting and that successive industrial innovation greatly influence industrial processes than before, hence more economic output is expected.

Technology is argued to be non-rival and partially excludable or excludable for a limited period of time, thus, firms cannot stop other economic agents from consuming the benefits resulting from their investments in research. In this case, investment by one firm in research for new products, sophisticated organisational and production methods adds to the existing stock of knowledge through spill-over effects. It is these additions to the stock of knowledge that will have permanent long term effect on overall economic growth (Romer, 1994: 12-13).

Romer (1990: s79-s80) distinguished knowledge into human capital and technology components that are not embodied in humans. Human capital is developed through formal education or on job training and characterised as rival and is hired from markets. The technology component such as a science law is non-rival. In a three sector model he demonstrated that both types of technology are critical for economic growth.

In summary, endogenous growth theory shows that additions to the stock of knowledge in the economy are very critical for economic growth. FDI is also considered to be an important source of novel knowledge in the host country. Lund (2010: 4) argued that FDI is a composite bundle of technology and capital and that it indeed adds to the host country's stock of knowledge through diffusion or the spill-over effect since technology is non-rival and either a non-excludable or a partially excludable good. Technology can be embodied in physical capital. As such, capital becomes a composite bundle. Romer (1986: 1020) also defined capital as a composite good because it was a combination of knowledge and capital. Therefore, under endogenous growth theory, FDI's impact on economic growth is twofold: firstly, it is via capital accumulation and secondly, via additions to knowledge stock.

Romer (1993: 143-144) acknowledged the role of FDI in bridging the knowledge gap between developing and developed countries. He argued that developing countries' poverty is partly due to lack of knowledge on how to create economic value and suggested that FDI closes this gap in the host country as it brings new technology such as packaging knowledge, and distribution and efficient payment systems.

The spill-over effect or the diffusion of technology from FDI to the rest of the host country's economy is argued to depend on a number of country specific factors that include the level of human capital development, quality of institutions, existence of developed financial markets (Nunnenkamp and Spatz, 2004: 55), and the degree of openness to the rest of the world (Romer, 1993:144).

The three theories of economic growth reviewed above seem to agree that the nexus between economic growth and FDI is positive and that causality runs from FDI to economic growth. According to Romer (1990: 144), Alfaro and Chanda (2003:9), Borensztein *et al.* (1998: 117), and Farkas (2012: 4) the relationship seems to be likely possible when the following absorptive capacities are satisfied in the host country:

i. FDI must compliment rather than compete with domestic investments;
ii. The host country should be well integrated;
iii. Need to have well-developed financial system in the host country; and
iv. There should be reasonable level of human capital in the host economy.

Though economic growth theories suggest that FDI cause economic growth, there exist another school of thought that it is economic growth that causes FDI and not the *vice versa*. The rate of economic growth is indicative of market demand and high demand will attract market-seeking FDI (Hornberger *et al*. 2011: 2). New business opportunities, low cost and high efficiency of production, and a big market that enables scale operations which culminate into economies of scale attract foreign direct investment. Economic growth measured by GDP serves as a good proxy of most of these factors (Matthew and Johnson, 2013: 85).

2.3 Empirical literature review

The nexus between FDI and economic growth has been subject to a lot of empirical investigation. Unfortunately, there is no agreement on whether the two variables are either positively or negatively related and on which one causes the other. While some studies such as Ocaya *et al* (2013:17), Maliwa and Nyambe (2015: 47-48) and Alhkasawneh (2013: 1771) have established long run relationship between economic growth and FDI, Belloumi (2014:16), failed to establish the long run relationship. On the other hand, we have studies that found a causal nexus between FDI and economic growth (Sridharan *et al*, 2009: 201), whilst others found no causal relationship at all or that economic growth cause FDI (Asghar *et al*, 2012: 90-93).

Studies that found a positive relationship between FDI and economic growth emphasised the importance of country specific conditions that determines the ability for the host country to derive macroeconomic benefits from FDI. Higher levels of the human capital stock and domestic investment, trade openness/integration and financial developments are established in empirical literature to be conduits through which an economy benefits from FDI. Borensztein *et al*, (1998: 123), in a cross-country analysis of 69 developing countries, found that FDI is very critical for economic growth and that it is highly productive in the presence of a good threshold of human capital in the receiving country. Farkas (2012: 10) found that FDI's positive impact on economic growth depends on the level of human capital, the development of financial markets and its complementarity with other growth determinants. The analysis was focused on a sample of 69 developing and developed countries.

The empirical literature therefore demonstrates that receiving FDI does not guarantee growth of the host country's economy. In some cases, FDI inhibits economic growth as established in Nigeria (Matthew and Johnson, 2013: 87-88; Nkechi and Okezie, 2013: 1145). Nunnenkamp and Spatz (2004: 80), in an analysis of the impact of the stock of FDI originating from the United States on the growth of economies of developing countries, concluded that positive growth effects are not automatic. Country specific characteristic like the level of GDP per capita, level of education, openness to trade and institutional development matter most. Countries that performed well in these characteristics were found to generally benefit from FDI.

The impact of FDI on economic growth also varies from one sector to the other. Generally, growth in the primary sector, that is, agriculture and mining is usually negatively associated with FDI, whilst manufacturing sector growth is positively associated with FDI. Alfaro (2003: 10) investigated the impact of FDI on economic growth on sectoral levels using a sample of 47 countries. The results showed that FDI had a negative impact on the primary sector, positive impact on the manufacturing sector, whilst the impact on the service sector was unclear. Abdul and Noy (2007: 16) also found a negative impact of FDI on mining and quarrying sector in Indonesia. The sector variability of FDI effects is explained by skills differential of labour required by respective sectors (Maliwa and Nyambe, 2015: 45). It can be reasoned that manufacturing is more technologically intensive than the others and that well developed countries have advanced manufacturing technologies due to earlier industrialisation hence, the strong correlation.

Although the review notes that the sign of correlation between economic growth and FDI is conditional on the levels of the absorptive variables that channel FDI influence to economic growth, it is also equally important to understand the dynamics of the nexus in the long run and that which of the two variables of interest causes the other.

Regarding long run relationship and causality, cointegration and Granger causality analysis are the main methods employed in empirical studies (Ocaya *et al*, 2013: 13; Belloumi, 2014:11; and Pradharan, 2010: 37). These methods are applied either in a bivariate or multivariate analysis. The results seem not to be sensitive to whether a bivariate or a multivariate analysis is adopted. Ocaya *et al*, (2013:17) employing a bivariate analysis on Rwandan data spanning 1970 to 2010 found that though FDI and GDP are cointegrated there is no causality between them. Similarly, Maliwa and Nyambe (2015: 47-48) employed a multivariate analysis on Zambian data for the period 1980 to 2012 and established cointegration between FDI and GDP and that FDI and GDP have no causal relationship. In the State of Qatar, Alhkasawneh (2013: 1771) using univariate analysis established that FDI and GDP are cointegrated and that FDI cause GDP.

The long run relationship and causality between economic growth and FDI also seems to vary from one country to another. Belloumi (2014:16) in Tunisia for the period spanning 1970 to 2008, using the bounds testing approach established that there was no long run relationship between economic growth, FDI and trade openness and that causality ran from economic growth and trade openness to FDI in the short run. Investigation of the nexus between FDI and GDP in the BRICS by Sridharan *et al* (2009: 201) established bidirectional causality between FDI and GDP for Brazil, Russia and South Africa, whilst causality running from FDI to GDP was found for India and China. Asghar *et al* (2012: 90-93) established cointegration between FDI and economic growth in selected Asian countries. Concerning causality, they found a bi-directional causality between FDI and economic growth in Malaysia, unidirectional causality from FDI to economic growth for Nepal, Singapore, Japan, and Thailand. A unidirectional causality running from economic growth to FDI was established for Pakistan, Bangladesh and Sri Lanka whilst non-causality was established for India, Maldives, Indonesia, China, Philippines, South Korea Dem and Singapore.

The cointegration analysis methodology adopted by various studies seems to contribute to variability in results of the nexus between economic growth and FDI. Johansen (1998) and Granger (1987) cointegration analysis are popularly employed by many studies considering very small samples even though the methodologies have a low power of test with such samples. Maliwa and Nyambe (2015: 45-47) applied the Johansen cointegration test on data series with 33 yearly observations, whilst Nkechi and Okezie (2013: 1143), Pradhan (2010: 38) and Fasanya (2012: 43) used the same analysis tool on data series containing 34, 38 and 41yearly observations, respectively. Under such circumstances it is difficult to really make bold claims about the validity of the results. The bounds testing approach to cointegration of Pesaran *et al* (2001) becomes a very attractive methodology when dealing with small data samples.

2.4 Framework of analysis

Literature reviewed in this chapter gives an intuition that the relationship between economic growth and FDI depends on country specific characteristics thus, it varies from one country to another. The characteristics of interest are domestic investment, financial development, trade openness, level of human capital stock, and GDP per capita. Depending on the level of these characteristics in a country, either economic growth may cause FDI or FDI may cause economic growth.

Drawing from the review, this study will theoretically relate changes in Zimbabwe's economic output to changes in FDI as follows:

$$\Delta GDP_t = f\left(\Delta I_t; \Delta FinD_t; \Delta OP_t; \Delta H_t; \Delta FDI_t\right) \quad \text{...} \quad (8)$$

$$\Delta FDI_t = f\left(\Delta I_t; \Delta FinD_t; \Delta OP_t; \Delta H_t; \Delta GDP_t\right) \quad \text{...} \quad (9)$$

Where GDP_t is total economic output, FDI_t is the foreign direct investment, I_t is domestic investment, $FinD_t$ is financial development, OP_t is trade openness, H_t is human capital and Δ is change or difference operator.

Equations (8) and (9) tell us that either variability in FDI is responsible for fluctuations in economic output or it is the oscillations in economic output that causes variations in FDI. Domestic investment, financial development, trade openness and human capital are control variables. It is important to note that the theoretical model presented here does not capture the technological effect of FDI.

2.5 Conclusion

The chapter reviewed both theoretical and empirical literature regarding the nexus between economic growth and FDI. Theoretical literature seems to suggest the existence of a positive relationship between FDI and economic growth and that FDI stimulates economic growth through supplementing domestic investment and technological transfer. However, empirical literature showed mixed results with some studies showing that FDI cause economic growth while in others economic growth causes FDI. The main conclusion is that the results vary from country to country owing to differences in the levels of variables that channel the influence of FDI to economic growth and the vice versa. The implication of the conclusion is that country case studies are preferred due to heterogeneity in country characteristics that are conduits to the effect of the two variables of interest in this study.

CHAPTER 3

METHODOLOGY AND DATA DESCRIPTION

3.1 Introduction

The Chapter presents data, data sources and the methodology employed to achieve the objectives of this study. Data and variable definition are presented first and lastly, an outline of the methodology used will be given.

3.2 Data and variables definitions

Zimbabwe's time series data on real GDP, FDI as a percentage of GDP, Trade Openness, Human Capital, Domestic Savings as a percentage of GDP spanning the period 1976 to 2011 has been used in this study. This period was chosen due to statistics being accurate and available during the period. GDP, Trade Openness, Domestic Savings data were retrieved from World Development Indicators whilst data on Human Capital was accessed from Penn World Tables. The period of analysis is restricted by data availability.

Real GDP was used to proxy Zimbabwe economic output and is measured in constant 2005 US$. FDI_t is expressed as a percentage of GDP_t. Trade Openness (OP_t) is defined as total trade (imports + exports)/GDP, Human Capital (H_t) is an index based on the years of schooling and returns to education and Domestic Savings (S_t) are a proxy for domestic investment measured in constant 2005 US$. OP_t, H_t and S_t are control variables. Literature has also identified financial development as a relevant control variable, however, this study did not use a proxy for financial development due to lack of sufficient data observations for various variables that can substitute financial development, covering the period of analysis considered in this paper.

For purposes of comparability, the data series were transformed into dimensionless measure before estimations. The transformation was effected by dividing each yearly value with the base year value and 1976 was used as the base year. There was no statistical methodology applied to choose the base year.

3.3 Estimation techniques

The estimation techniques employed in this study followed four steps. Descriptive data analysis was carried out first to give a general picture of how the key variables evolved. Phillips - Perron

(PP) and Augmented Dicky Fuller (ADF) unit root tests for stationarity were carried out in the second step to avoid spurious regressions. Thirdly, cointegration analysis was used to ascertain existence of long run relationship between economic growth and FDI. Finally, the study tested the Granger causality between FDI and economic growth in a vector error correction framework (Belloumi, 2014: 12).

3.3.1 Augmented Dicky Fuller (ADF) Unit root tests

Regression analysis with time series requires one to give particular attention to stationarity characteristics of the data series. According to Granger and Newbold (1974 in Enders, 2004:112) regressions with non-stationary time series may result in spurious regression or regression into nothingness. Such regressions cannot be used to make sound policy inferences (Fasanya, 2012: 42). In fact, the Ordinary Least Squares statistical properties do not hold when regressing data series that are non-stationary (Maliwa and Nyambe, 2015: 46). The Augmented Dicky Fuller (ADF) unit root test was used to examine the stationarity properties of the data series in this study. The ADF model self-correct for autocorrelation or whiten the errors as it includes lags of the dependent variable in its specification (Nkechi and Okezie, 2013: 1143). The lag length is determined by the Akaike Information Criterion (AIC). The Akaike Information Criterion has the advantage of minimizing the chance of under estimation while maximizing the chance of recovering the true lag length. Following Alkhasawneh (2013: 1769) and Sridharan et al (2009: 200), this study specified the unit root test model as follows:

$$\Delta Y_t = a_0 + a_1 t + a_2 Y_{t-1} + \sum_{i-1}^{\gamma} \alpha_i \Delta Y_{t-i} + \mu_t \text{ .... } (10)$$

Where Δ is the difference operator, Y_t is the variable being examined for the presence of unit root, a_0 to a_2 and α_i are parameters to be estimated, t is the trend variable and μ_t is the error term.

The null hypothesis for unit root is tested against the alternative hypothesis that there is no unit root. The null for unit root is rejected if the calculated ADF statistic is less than the critical values from Fuller's table.

The ADF test usually suffer from low power of test especially with short time series data, thus it is preferred to use both the ADF and the Phillips- Perron unit root test in order to get a reasonable conclusion regarding the order of integration (Nanthakumar and Subramaniam, 201: 263).

3.3.2 Phillips-Perron (PP) Unit root test

In addition to the ADF unit root test, the study also applied the PP unit root test. Unlike the ADF unit root test, the PP unit root test has greater power to reject a false null hypothesis for unit root (Enders, 2004: 242). The ADF and PP unit root tests statistic have the same asymptotic distribution; however, they differ in how they deal with serial correlation in the error terms. Whilst the ADF test adds lagged difference terms of the dependent variable to control for serial correlation, the PP test use nonparametric statistical method (Gujarati, 2004: 818). This study, following Enders (2004: 241), specified the PP unit root test regression as follows:

$$\Delta Y_t = \beta' D_t + \alpha_1 Y_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

where μ_t is I(0) error term and D_t is a vector of deterministic terms such as constant and trend. The null to be tested is that the time series has a unit root against the alternative that the time series has no unit root.

3.3.3 Cointegration test

After stationarity analysis, the study proceeded to investigate the nature of the relationship between economic growth and FDI using cointegration test. The test investigates whether there exist a long run relationship among variables of interest. Existence of cointegration relationship in variables implies that variables move together in the long run and any short run shocks to the long term trend will be self-corrected. The absence of cointegration means that variables can wander away from each other thus they have no equilibrium relationship (Pradhan, 2010: 38).

There are many methodological constructs for investigating the long run relationship. Engle and Granger (1987) are among the popular pioneers of cointegration analysis. The Engle-Granger method is easy to follow and estimate. However, the model requires predetermined dependent variables and it dictates that variables must be integrated to the order one. The power of the Engle and Granger test (1987) cointegration test is best with long time series data. For the case of this study where the causality between economic growth and FDI is not clear beforehand the Johansen (1998) cointegration test seems to be a potential candidate. However, the test also requires that variables be integrated to the order one; and the power of test is better the longer of the time series. Given the limited yearly observations spanning 36 years considered in this study and that variables used are a mixture of I(1) and I(0), the Engle and Granger (1987) and the Johansen (1998) cointegration tests are not suitable for this analysis.

This study employed the bounds testing model of Pesaran and Shin (1997) and Pesaran et al. (1999, 2001) to analyse whether there is a long run relationship between Zimbabwe's economic growth and FDI inflows. The model resembles a general VAR model of order p in Y_t. Where Y_t is a column vector of GDP_t, FDI_t, OP_t, S_t and H_t. The bounds testing model acknowledges the fact that current economic variables are influenced by their past values together with other explanatory variables.

This study has been influenced by two factors to apply the bounds testing approach. Firstly, the smaller sample of 36 observations considered in this study has influenced the adoption of the methodology. The bounds test approach has high power of test in smaller samples compared to the Engle and Granger (1987) and the Johansen (1998) cointegration tests. Secondly, the variables used in this study are a mixture of I(1) and I(0). The bounds test model can be applied when variables are I(1), I(0) or when they are a mixture of I(1) and I(0). The model yields unbiased and asymptotically normal parameter estimates in all the above cases (Pesaran et al., 2001).

Furthermore, the bounds testing model does not require pretesting of variables for unit root (Pesaran et al, 2001). Thus, the interrogation of stationarity properties done in this study was for the purpose of verifying that no variable is integrated to the order more than one. The low power of test inherent in unit root test methods has no influence on the results of the bounds test method. This model also accommodates varying lag length on each regressor and can be applied in cases where some of the regressors are endogenous.

Following Pesaran and Shin (1997) and Pesaran et al. (2001), this study transformed equation 8 and 9 into an ARDL (p, q1, q2, q3, q4) bounds testing model as follows:

$$\Delta GDP_t = \alpha_{01} + \sum_{i=1}^{p}\alpha_{1i}\Delta GDP_{t-i} + \sum_{i=0}^{q}\alpha_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{q}\alpha_{3i}\Delta OP_{t-i} + \sum_{i=0}^{q}\alpha_{4i}\Delta S_{t-i} + \sum_{i=0}^{q}\alpha_{5i}\Delta H_{t-i}$$

$$+ b_{11}GDP_{t-1} + b_{21}FDI_{t-1} + b_{31}OP_{t-1} + b_{41}S_{t-1} + b_{51}H_{t-1} + \mu_{1t} \quad \text{.................................} \ (12)$$

$$\Delta FDI_t = \alpha_{02} + \sum_{i=1}^{p} \alpha_{1i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_{4i} \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_{5i} \Delta H_{t-i}$$

$$+ b_{12} FDI_{t-1} + b_{22} GDP_{t-1} + b_{32} OP_{t-1} + b_{42} S_{t-1} + b_{52} H_{t-1} + \mu_{2t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (13)$$

$$\Delta S_t = \alpha_{03} + \sum_{i=1}^{p} \alpha_{1i} \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{4i} \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_{5i} \Delta H_{t-i}$$

$$+ b_{13} S_{t-1} + b_{23} GDP_{t-1} + b_{33} FDI_{t-1} + b_{43} OP_{t-1} + b_{53} H_{t-1} + \mu_{3t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (14)$$

$$\Delta OP_t = \alpha_{04} + \sum_{i=1}^{p} \alpha_{1i} \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{4i} \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_{5i} \Delta H_{t-i}$$

$$+ b_{14} OP_{t-1} + b_{24} GDP_{t-1} + b_{34} FDI_{t-1} + b_{44} S_{t-1} + b_{54} H_{t-1} + \mu_{4t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (15)$$

$$\Delta H_t = \alpha_{05} + \sum_{i=1}^{p} \alpha_{1i} \Delta H_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{4i} \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_{5i} \Delta S_{t-i}$$

$$b_{15} H_{t-1} + b_{25} GDP_{t-1} + b_{35} FDI_{t-1} + b_{45} OP_{t-1} + b_{55} S_{t-1} + \mu_{5t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (16)$$

All variables are as previously defined and Δ is the difference operator. OLS was used to estimate equation 12 to 16. The null of no cointegration was tested using the Wald or F-Statistic. Specification of the null hypothesis took the following form: $H_0 : b_{1i} = b_{2i} = b_{3i} = b_{4i} = b_{5i} = 0$ agaist the alternative: $H_1 : b_{1i} \neq b_{2i} \neq b_{3i} \neq b_{4i} \neq b_{5i} \neq 0$ for all equations.

Rejection of the null of no cointegration suggests the existence of long run relationship among variables. This occurs when the F-statistic is greater than the upper critical bounds value. If the F- statistic fall below the lower critical bounds value the null hypothesis is accepted. Inference will be difficult if the F-statistic fall between the upper and lower critical bounds values (Pesaran et al, 1999). Critical bounds values used in this study were accessed from Narayan (2004). Unlike Pesaran et al. (2001) critical values which were generated using samples observations of about 1000, Narayan's critical bounds values were developed using small samples of 30 to 80 observations which make them more suitable for a sample size considered here. Using critical bounds values from Pesaran et al. (2001) risks rejecting the null hypothesis when it should be accepted.

Akaike information criterion (AIC) was used to determine the optimal lag length. According to Pesaran et al. (2001), the results of the bounds testing model are valid if the model is free from serial correlation. In that regard, the bounds testing models were subjected to serial correlation test to validate model's robustness.

3.3.4 Vector Error correction model

Given establishment of the long run relationship, the study went on to estimate the Granger causality between economic growth and FDI. The Granger causality analysis is underpinned by the concept that the future is predicted by the past and the opposite does not hold (Gujarati, 2004: 697). Given two variables X and Y for example, X is said to Granger cause Y if past values of X have explanatory power for present values of Y. The conventional Granger causality analysis is invalid when variables are cointegrated as is the case with this study (Engle and Granger, 1987: 266; Bahmani-Oskooee and Alse, 1993: 537). Alternatively, this study, following Sridharan et al (2009: 201) and Fasanya, (2012: 45) performed causality analysis in a vector error correction construction specified as follows:

$$\Delta GDP_t = \beta + \sum_{i=1}^{q} \alpha_0 \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_1 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta H_{t-i} + \varphi_1 ECT_{t-1} + \varepsilon_{1t} \quad (17)$$

$$\Delta FDI_t = \beta + \sum_{i=1}^{q} \alpha_0 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta H_{t-i} + \varphi_2 ECT_{t-1} + \varepsilon_{2t} \quad (18)$$

$$\Delta S_t = \beta + \sum_{i=1}^{q} \alpha_0 \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta H_{t-i} + \varphi_3 ECT_{t-1} + \varepsilon_{3t} \quad (19)$$

$$\Delta OP_t = \beta + \sum_{i=1}^{q} \alpha_0 \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta S_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta H_{t-i} + \varphi_4 ECT_{t-1} + \varepsilon_{4t} \quad (20)$$

$$\Delta H_t = \beta + \sum_{i=1}^{q} \alpha_0 \Delta H_{t-i} + \sum_{i=0}^{q} \alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta OP_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta S_{t-i} + \varphi_5 ECT_{t-1} + \varepsilon_{5t}$$

(21)

where Δ is the difference operator, q is the maximum lag length, ECT is the error correction term, α_0 to α_4 are parameters to be estimated and all other variables are as defined in section 3.2.

Equations 17 to 21 were individually estimated using the OLS method and the lag length was determined by the AIC.

The ECT_{t-1} in equations 17 to 21 should be negative and take on absolute values of between zero and one. This lagged error term captures the speed of adjustment to the long run equilibrium of any short term disturbances. A statistically significant lagged error term communicates two things. First, it reconfirms the existence of the long run relationship among variables and secondly it indicates that all independent variables Granger cause the dependent variable in the long run. Therefore, the long run causality in equations 12 to 16 is examined by the null hypothesis of non-causality specified as:

$H_0 : \varphi_i = 0$ against the alternative null for causality: $H_1 : \varphi_i \neq 0$

In the short run, the null for no-causality in equation 12 to 16 is specified as follows:

$H_0 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$ against the alternative that $H_1 : \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0$

To ensure the robustness of the results equations 12 to 16 were subjected to various diagnostic tests for serial correlation, heteroscedasticity, normality and stability test.

3.4 Conclusion

The methodology outlined in this Chapter has been tailor made to achieve the objective of this study. The study intended to establish the causal relationship between economic growth and foreign direct investment. The Granger causality analysis has been carried out in a vector error correction model. Control variables that include trade openness, domestic savings, and human capital have been included in the multivariate analysis.

CHAPTER 4

ESTIMATION AND RESULTS ANALYSIS

4.1 Introduction

This Chapter presents the results of applying the methodology presented in Chapter 3 on Zimbabwean data series. The Chapter proceeds by giving the descriptive data analysis that includes graphical analysis of series evolution and summary statistics. Results for the analysis of stationarity properties of data will be presented next followed by cointegration results. Lastly, the Chapter presents the Granger causality results which are the principal results of this study.

4.2 Descriptive data analysis results

The descriptive data analysis involved graphical analysis of the evolution of key variables and summary statistics of all variables included in this study.

4.2.1 Graphical analysis of the GDP and FDI evolution

Graphical analysis was used to assess the trend of real GDP in levels and FDI expressed as a percentage of GDP for the period 1976 to 2011. Figure 1 shows that Zimbabwe's real GDP has been increasing since 1976 up to 1998. After 1998, real GDP trend began to fall reaching its lowest in 2008 and thereafter it has been on the increase. It is also shown on the same figure that FDI has been slightly increasing since 1977 reaching its peak in 1998. Thereafter it began to fall reaching the lowest point in 2004. Since 2005, FDI began a rising trend through to 2011.

It can be observed that in periods where GDP was rising, FDI was also rising. This is evident from both trends for the period 1977 to 1998 and from 2008 to 2011. Both trends were also declining during the period 1999 to 2005. This is suggestive of the fact that these variables may have a long run relationship. The decade between 1999 and 2008 was characterised with multiple economic challenges faced by Zimbabwe. The challenges faced by Zimbabwe, include high inflation, fast track land reform programme and during this period was the start of the rapid fall in the GDP and FDI in the country.

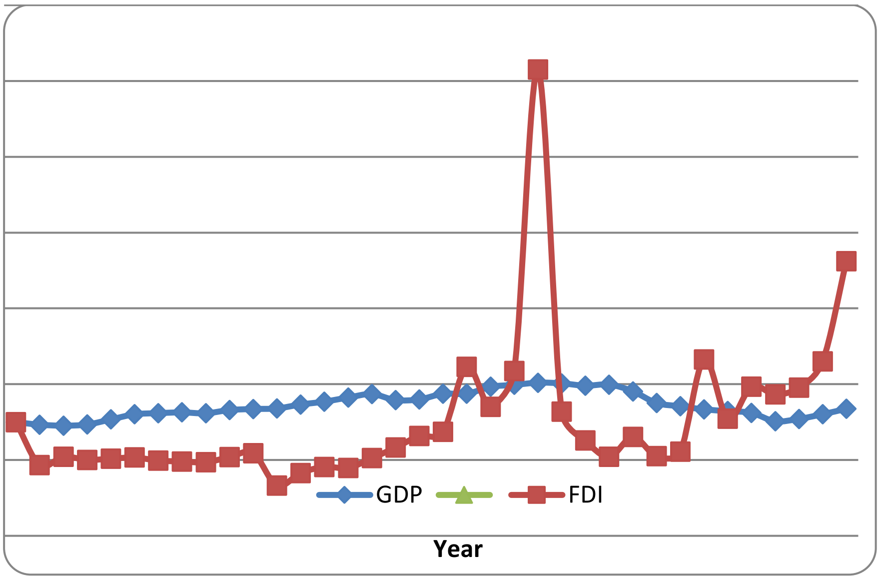

Figure 1: Trends of Zimbabwe real GDP and FDI Transformed/Indexed data from 1976 to 2011 *(RESERVE BANK OF ZIMBABWE, 2011)*

4.2.2 Summary statistics of variables

According to Mantalos, (2010:25) The Jarque Beta test is the measure of goodness-of-fit test of whether sample data have skewness and kurtosis matching a normal distribution. The summary statistics of variable used in this study are presented in table 1. It can be observed that the mean value of real GDP is 1.45, while FDI as a percentage of GDP has a mean of 1.06. Savings as a percentage of GDP, trade openness and human capital have means of 0.49; 1.18 and 1.32 respectively. Skewness and kurtosis values are also given in table 1.

Table 1: Summary statistics

	GDP	FDI	H	OP	S
Mean	1.446	1.057	1.316	1.181	0.489
Median	1.356	0.276	1.363	1.142	0.761
Maximum	2.040	10.302	1.556	2.019	1.195
Minimum	0.906	-0.672	1.000	0.954	-1.809
Std. Dev.	0.342	1.982	0.190	0.197	0.743
Skewness	0.251	3.166	-0.302	2.305	-1.564
Kurtosis	1.979	14.604	1.610	10.178	4.698
Jarque-Bera	1.943	262.125	3.445	109.149	19.008
Probability	0.379	0.000000	0.179	0.000000	0.000075
Sum	52.064	38.039	47.366	42.51856	17.621
Sum Sq. Dev.	4.092	137.491	1.267	1.359516	19.312
Observations	36	36	36	36	36

4.3 Unit root test for stationarity results

Prior to model estimation, stationarity properties of the data were investigated using the ADF and Phillips-Perron unit root test methods and the results both in levels and in first difference are given in Table 2 and Table 3 below. The ADF results in Table 2 show that variables GDP, savings as a percentage of GDP, and human capital are integrated of order one, whilst FDI and trade openness variables are integrated of order zero.

Similar results are generated when the Phillips-Perron unit root test method is applied as shown in Table 3. FDI and trade openness are integrated of order zero, and the variables GDP, savings and human capital are integrated to the order one.

Table 2: Results for the ADF unit root test

Variable	Model specification	ADF Levels		ADF First Difference		Order of integration
		T-statistic	Results	T-statistic	Results	
GDP_t	Intercept	-2.031880 (-2.951125)	Non Stationary	-3.571177 (-2.951125)	Stationary	I(1)
FDI_t	Intercept	-3.610463 (-2.948404)	stationary	-6.102205 (-2.954021)	Stationary	I(0)
OP_t	Intercept	-3.487100 (-2.948404)	stationary	-5.815501 (-2.954021)	Stationary	I(0)
S_t	Intercept	1.667890 (-2.954021)	Non stationary	-7.137886 (-2.954021)	Stationary	I(1)
H_t	Intercept	-0.016897 (-3.690814)	Non stationary	-14.13485 (-3.710482)	stationary	I(1)

NB: Critical values are given in parentheses at 5% level of significance

Table 3: Results for the PP unit root test

Variable	Model specification	PP Levels		PP First Difference		Order of integration
		T-statistic	Results	T-statistic	Results	
GDP_t	Intercept	-1.592693 (-2.948404)	Non Stationary	-3.571177 (-2.951125)	Stationary	I(1)
FDI_t	Intercept	-3.610463 (-2.948404)	stationary	-8.659614 (-2.951125)	Stationary	I(0)
OP_t	Intercept	-3.487100 (-2.948404)	stationary	-8.333991 (-2.951125)	Stationary	I(0)
S_t	Intercept	-0.607823 (-2.948404)	Non stationary	-9.031226 (-2.951125)	Stationary	I(1)
H_t	Intercept	-1.585595 (-2.948404)	Non stationary	-2.918158 (-2.851125)	stationary	I(1)

NB: Critical values are given in parentheses at 5% level of significance

4.4 Cointegration test results

Cointegration analysis was done using the Bounds testing approach of Pesaran et al. (2001). Results of this test are given in Table 4 below. Cointegration among variables is established when real GDP and FDI are dependent variables at 5% level of significance. This implies that the variables being investigated have a long run relationship. Following Pesaran et al. (2001), the results were validated through testing for serial correlation. Table 5 shows the serial correlation test results for the bounds test approach. The results show no evidence of serial correlation suggesting that the bounds test results are valid.

Table 4: Cointegration results

Equation number	Dependent variable	F-statistic	Decision
12	$D(GDP_t)$	4.612979**	Cointegrated
13	$D(FDI_t)$	5.356672**	Cointegrated
15	$D(OP_t)$	3.395140	No Cointegration
14	$D(S_t)$	1.624236	No Cointegration
16	$D(H_t)$	2.090704	No Cointegration

NB: ***, ** and * show significance at 10%, 5% and 1% levels respectively

Critical values	**1%**	**5%**	**10%**
Upper Bounds	5.580	4.062	3.435
Lower Bounds	4.097	2.962	2.460

Table 5: Results for serial correlation for the ARDL Bounds tests

Equation number	Dependent Variable	LM Test F- Statistic	P-Value
12	$D(GDP_t)$	1.091238	0.3541
13	$D(FDI_t)$	2.570411	0.1042
15	$D(OP_t)$	0.099148	0.9060
14	$D(S_t)$	0.497162	0.6152
16	$D(H_t)$	0.332641	0.7207

4.5 Causality test: Vector error correction model results

Given the confirmation that the variables under consideration are cointegrated, the conventional Granger causality analysis is not compatible with such data (Fasanya 2012: 47). Therefore, the researcher carried out Granger causality analysis using the vector error correction model. Cointegration has been established when either GDP or FDI is a dependent variable and for that reason the vector error correction model was employed only on equation 17 and 18. Results of the vector error correction model are given in Table 6 below.

Table 6: Causality test: Vector error correction model results

INDEPENDENT VARIABLES	DEPENDENT VARIABLES	
	ΔGDP_t	ΔFDI_t
β	0.036778	-0.500774
ΔGDP		-1.701793
$\Delta GDP(-1)$	0.726974***	
$\Delta GDP(-2)$		1.876943
ΔFDI	0.003559	
$\Delta FDI(-1)$		-0.034939
$\Delta FDI(-2)$		-0.195778
ΔOP	0.267463**	1.640310
$\Delta OP(-2)$		3.067495
$\Delta OP(-3)$		6.946907
ΔS	0.179390***	0.723650
$\Delta S(-1)$	0.080836	
ΔH	-3.546675	
$\Delta H(-1)$	2.161845	
$\Delta H(-3)$		0.736402
$\Delta H(-4)$		24.22119
$ECT(-1)$	-0.896077***	-0.966390*

NB ***, **, and * show the level of significance at 1%, 5% and 10% respectively.

The vector error correction model results show that when GDP is the dependent variable the coefficient of FDI has the correct sign though insignificant. This implies that in the short run the past values of FDI do not explain the present fluctuation in the GDP value. Thus FDI does not cause economic growth in Zimbabwe in the short run. The t-statistic of the error correction term is highly significant at 1% level and has the correct sign whilst within the expected range. The error correction term reconfirms the existence of a long run relationship between GDP and FDI in Zimbabwe. The error correction term also shows that all the independent variables in the model explains GDP in Zimbabwe in the long run. Therefore, FDI Granger causes economic growth in Zimbabwe in the long run. About 90% of any deviation from average GDP will be corrected in the next period.

Trade openness and domestic investment coefficients enter the GDP equation with correct signs and significant at 5% and 1% levels respectively. The results imply that the past values of trade openness and domestic savings/investment explain the present fluctuations of GDP in

Zimbabwe in the short run. This suggests that both trade openness and domestic investment Granger cause economic growth in Zimbabwe in the short run. Furthermore, trade openness and domestic investment Granger cause economic growth in Zimbabwe in the long run as suggested by the error correction term.

Human capital coefficients are insignificant and therefore have no causal effect on GDP in the short run. However, Human capital Granger causes GDP in the long run as evidenced by the significant coefficient of the error correction term.

When FDI is the dependent variable, all short run coefficient are insignificant. Thus, GDP, trade openness, domestic investment and human capital do not Granger cause FDI in the short run. However, in the long run they all Granger cause FDI in Zimbabwe though the causal effect is weak as suggested by the error correction term which is significant at 10% level.

4.6 Diagnostic Test

The results of the vector error correction model are valid as shown by the results of various diagnostic tests given in Table 7. The vector error correction model is correctly specified and stable thus it does not suffer from structural breaks. Table 7 presents the results of the Breusch-Godfrey LM test, White Heteroskedasticity test and, Normality test. However, it is noted that the diagnostics techniques employed are large sample tests and this suggest that there is no 100% guarantee that the model is free from the pathologies. Model stability was tested using the CUSUM and CUSUM of Squires tests whose results are within the critical bounds at 5% level of significance as given in Figures 2 and 3.

Table 7: Diagnostic tests for the Vector error correction model

MODEL	Breusch-Godfrey LM Test		White Heteroskedasticity Test		Normality Test	
	Statistic	**Prob**	**Statistic**	**Prob**	**Statistic**	**Prob**
ΔGDP_t	1.595251	0.2144	1.135794	0.3760	1.079927	0.582770
ΔFDI_t	0.646385	0.5363	0.463804	0.9035	1.654824	0.403951

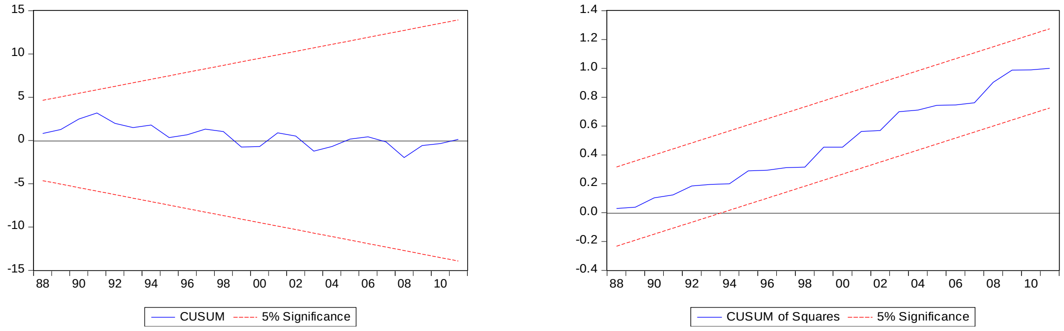

Figure 2: CUSUM and CUSUMQ test statistic for equation 17 (ΔGDP_t)

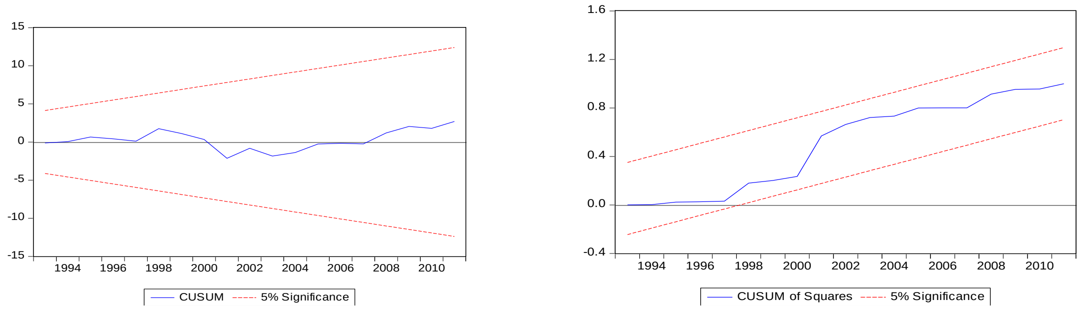

Figure 3: CUSUM and CUSUMQ test statistic for equation 18 (ΔFDI_t)

4.7 Conclusion

The analysis has established that GDP and FDI are cointegrated. This means they have a long run relationship. Causality analysis revealed that there is no causal effect in either direction between FDI and GDP in Zimbabwe in the short run. In the long run, a bi-directional Granger causality has been established. FDI long run causal effect on GDP was found to be highly significant at 1% level whilst GDP's causal effect on FDI was found weak at 10% significant level. The results of this study are similar to those established by other researchers. Maliwa and Nyambe (2015: 49), and Pradhan (2010: 40) have established that economic growth and FDI have a long run relationship in Zambia and India respectively. Asghar et al (2012: 90-93) established a bi-directional causality between FDI and economic growth in Malaysia. Sridharan et al (2009: 201) found that economic growth leads to an increase in FDI.

CHAPTER 5

DISCUSSION OF RESULTS AND POLICY IMPLICATIONS

5.1 Introduction

The objective of this study was to analyse the causality relationship between Zimbabwe's economic growth and FDI. Cointegration and Granger causality techniques were employed to analyse the relationship. It was established that there exists a long run relationship between economic growth and FDI in Zimbabwe. The results also indicate that there is a bi-directional causality relationship between economic growth and FDI in the long run. However, the causal effect running from FDI to economic growth is relatively stronger as it is highly significant at 1% whilst that from GDP to FDI is weak as it is significant at 10% level. Trade openness and domestic investment were found to Granger cause economic growth both in the short and long run whereas human capital only Granger causes economic growth in the long run.

5.2 Discussion of results

The study revealed strong evidence that FDI is a source of economic growth in Zimbabwe and that it provides a long term policy option to stimulate economic growth. The generated economic growth in turn has a feed back in attracting more FDI into the economy thereby setting in motion a self-perpetuating growth cycle. The feedback effect from economic growth to FDI suggests that among other types of FDI that comes to Zimbabwe is market seeking FDI. It is important, however, to bear in mind that according to data analysed in this study evidence in support of this feedback from GDP to FDI is weak.

Increasing inflows of FDI into Zimbabwe would boost its economic growth. The results of this study present FDI as a factor of long term economic growth in Zimbabwe. Policy makers are being pointed to a non-debt source of economic growth that can be exploited in Zimbabwe.

Trade openness and domestic savings (as a proxy for domestic investment) were established as significant determinants of economic growth in Zimbabwe both in the short and long run. Human capital impact on economic growth is found to be in the long run. The implication of this analysis is that though FDI is established as a critical factor in stimulating economic growth in Zimbabwe, it is not the only stimulant for economic growth. Opening up trade, increasing domestic investment and human capital development among other initiatives are also critical ingredients of the recipe.

5.3 Policy implications

The results of this study have far reaching policy implications. Firstly, the study flags out that attracting FDI should be an integral part of Zimbabwe's macroeconomic growth policy framework. Secondly, policy initiatives to attract FDI should not stifle domestic investment, opening up of trade and development of human capital as all these are crucial to achieve economic growth in Zimbabwe.

5.4 Conclusion

An inquiry has been made in this study on the causal nexus between economic growth and FDI in Zimbabwe. The bounds testing approach to cointegration and Granger causality methodology were applied and results suggested that there is a bi-directional causality between FDI and economic growth in the long run. Domestic investment, human capital and trade openness were also found to be crucial determinants of economic growth in Zimbabwe.

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