The Impact of FDI on Economic Growth in Southern African Countries

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ABSTRACT

Developed countries and multilateral agencies encourage developing countries to embrace and promote Foreign Direct Investment (FDI) as an instrument to improve domestic production which will lead to economic growth and development. This is premised on the fact that FDI comes with transfer of technology, new and advanced management approaches, technical skills and access to international markets. However, researchers have shown that occasionally FDI inflows achieve the opposite as they compete for the same markets with local industries and as a result they crowd out local industries leading to higher unemployment. Further, research has shown that most international financial crises were caused by rapid withdrawal of FDI. In essence FDI can have positive and can also have negative effects on economic growth.

This research assesses the impact of FDI on economic growth as measured by the Gross Domestic Product (GDP) in eight selected Southern African countries using annual econometric data from 2000 to 2015. The research also examines how the interaction of FDI with human capital development and efficiency of the financial markets impact GDP growth.

An analysis of the data using panel regression methodology has shown that there is no evidence of a relationship between GDP growth and FDI. The same conclusion was reached for domestic credit, interest rate spread, internet penetration and Human Development Index (HDI). However, the data analysis showed a positive relationship between GDP growth and population growth.

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ACRONYM TABLE

1. BD – Benchmark Definition of Foreign Direct Investment
2. BPM – Balance of Payments Manual
3. EPI – Equity Portfolio Investments
4. FDI – Foreign Direct Investment
5. GDP – Gross Domestic Product
6. HDI – Human Development Index
7. IMF – International Monetary Fund
8. MNE – Multinational Enterprise
9. OECD – Organisation for Economic Cooperation and Development
10. SADC – Southern African Development Community
11. UNCTAD – United Nations Conference on Trade and Development
12. WB – World Bank

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1 INTRODUCTION

1.1 Background of Study

All the countries in southern Africa can be classified as developing, a category which is composed of the world's poor countries. These countries' economies are characterized by low Gross Domestic Product (GDP), low levels of employment, and low income levels on the economic front and weak democracies on the political front. However, most of these southern African countries have abundant natural resources which should have given them the means by which to improve their economies. It is generally accepted that the reason why countries in Sub-Saharan Africa (SSA) are in this predicament is because of the lack of capital, skills and technology required to exploit these natural resources and, in some cases, poor political governance and political instability.

Multilateral institutions and academia have insisted that for developing countries to accelerate economic growth and social development they should promote foreign direct investment (FDI) in their territories. So in essence the concept of FDI has been proffered as a solution to ignite the much needed economic growth and development (Fischer, 1999). It is envisaged that FDI will provide the missing capital, technology and skills required to exploit the abundant natural resources that countries in southern Africa have. Such activities will then create employment, improve domestic production and in the process increase the level of skills in the developing countries. In general, some literature suggests a positive relationship between FDI and economic development (Kurtishi-Kasrati, 2013). Further, when a country decides to pursue FDI then that country will then be forced by that pursuit to inculcate democratic values and principles and proper governance in its political and administrative systems.

The vehicles that bring FDI into the developing countries are varied. The main drivers of FDI are the Multinational Enterprises (MNEs). When investing in countries, the MNE's objectives are not necessarily aligned with those of the host countries. Most MNEs are inspired by a desire to increase profits, an objective which is usually at odds with the objectives of economic and social development as envisaged by the receiving countries (Bitzenis, 2004). Some studies have shown that FDI can have negative spill-over effects on the domestic economies through repatriation of profits and crowding out of the local industries. Studies have shown that if foreign firms are substantially more advanced technologically than the domestic firms this could result in failure of domestic companies due to loss of market share, generally referred to as 'market stealing' (Schoors & van der Tol, 2002).

This research seeks to establish whether FDI is having a significant impact on GDP growth in countries in southern Africa. Furthermore, this research will try to look at how other variables enable the economies to absorb and convert the FDI into GDP growth. Some studies have shown that human capital development and financials systems development might facilitate the absorption of FDI in developing economies (Durham, 2004).

1.2 Statement of research problem

FDI may result in positive significant growth because of an increase in available capital for production, or negative growth because of the harmful spill overs. The eight countries included in the study received net inflows of FDI totalling US$1.6 billion in 2000. This number rose over the years to reach US$9.5 billion in 2015 after reaching a peak of US$18.8 billion in 2013. As a proportion of the GDP, the net FDI inflows average 4.8% of the GDP annually for the eight countries over the period 2000 to 2015 (see Table 2 and Appendix B). This research will seek to establish whether FDI has had a significant impact on GDP growth in countries in these countries using data collected over the 16 year period.

The research will also seek to understand how some underlying variables facilitate the absorption of FDI by the respective countries. De Mello (1999) and other researchers suggested that there are several variables that could contribute to a country's absorptive capacity. The variables that are mentioned include human capital development and the level of development of the financial system (Borensztein, De Gregorio, & Lee, 1998).

There is currently no literature that covers these aspects of capital flows with particular emphasis on southern Africa. Current literature on this relates to other countries in other regions in the developing world without looking at countries from southern Africa separately. Most studies include developing countries from South America, Asia and countries from the whole of Africa (Xiaoying & Xiaming, 2005).

Answers to the above questions will help policy makers in framing investment policies and economic development agendas for their economies as they will have a better understanding of how they can maximise the impact of FDI in achieving higher domestic production and GDP growth.

1.3 Research Objectives and Hypotheses

The research assesses the impact of FDI on GDP growth in the selected countries in southern Africa using data from 2000 to 2016. FDI comes with both positive and negative spill overs and hence it is necessary to assess, using scientific methods, if the sum total is positive and significant enough for countries in the region to continue to pursue FDI as a way of increasing or improving domestic production and economic growth.

FDI might not work in isolation but works with other economic and social variables such as human capital and financial systems within the host country. The research also probes if these variables help facilitate the absorption of FDI in countries in Southern Africa.

The research will seek to give policy makers the much needed information and recommendations on how to maximise the benefits of FDI in their territories.

1.4 Justification of the study

Countries in southern Africa are all classified as 'developing countries' implying that they are not yet developed or that they are lagging behind other countries in terms of GDP and GDP growth. This is the case even though they have abundant natural resources such as oil, fertile soils, good climate and precious minerals which can be exploited to improve their economies and the standard of living of their citizens. However, to exploit these resources a combination of capital,

technology and skill are needed and these are sometimes perceived to be in short supply in most of these countries. The view has been that FDI could bridge that gap as MNEs and other multilateral agents and DFIs could bring in capital, technical skills and technology to southern Africa.

However, as previous alluded to, the objectives of MNEs are not necessarily aligned to the objectives of the countries receiving the FDI and in some instances such investments can actually destroy the domestic companies and reduce employment. Further, the issue of repatriation of profits also reduces capital accumulation in the domestic economy. In Eastern Europe after the demise of communism, a lot of FDI flowed into that region but not all countries recorded positive economic growth (Schoors & van der Tol, 2002).

This makes a case for a careful scientific analysis of the impact of FDI in southern Africa. This analysis can be used by policy makers and politicians in crafting policies around FDI in a way that will maximize the impact on economic growth and development outcomes in their respective states.

2 LITERATURE REVIEW

2.1 Introduction

This chapter reviews previous academic efforts to assess the impact of FDI on economic growth with an extra emphasis on variables that have a bearing on absorption of FDI in the host economy. The emphasis of this review will be on the methods applied, the variables used and the nature and sources of data as well as the findings in terms of the above-mentioned relationship. One of the challenges of assessing the impact of FDI on economic growth is the presence of other intervening variables which affect the local economy's ability to absorb the FDI and convert it into economic growth.

The first part of the chapter will examine the history of FDI in Africa and other parts of the world and the way it is defined in general terms. The second part will then review the evolution of economic growth models over time and the third and final section will review empirical evidence and results from previous researches.

2.2 History of FDI

FDI is defined as cross border investment in a business or venture by a foreign investor in which the foreign investor will acquire substantial control of the business (Mello L. R., 1999). The investment could be a new project or company called 'greenfield investment' or investment in an existing business enterprise, called 'brownfield investment' by buying shareholding. Companies that invest in foreign territories are generally called 'multinational companies' (MNCs). Where an investment by a foreign investor does not give the investor significant control of the entity, ideally less than 10 percent, such an investment is not classified as FDI but rather as 'equity portfolio investment' (EPI) (Durham, 2004) and (Herzer, Klasen, & Nowak-Lehmann, 2008). However, this '10 percent rule' is not necessarily applied universally as different national statistical agencies have a free hand in terms of defining the threshold of ownership which they apply when collating their investment statistics. However, it is important to note that the International Monetary Fund (IMF) through its last publication in the series called Balance of Payments Manual, (BPM5) of 1993 recognise the '10 percent rule' and therefore it has become the dominant definition of the acceptable threshold of ownership of stock by a foreign resident or company (Linsi, 2017). In fact it was only after 1950 that expert consensus sought to differentiate foreign investments by portfolio investors from foreign investment by direct investors who would move into the territory and establish companies with a longer term perspective. This type of investor would move equipment, new technology and human capital, where possible, to the foreign territories and clearly the interests of this type of investor are not limited to the provision of monetary capital only but also include managerial influence over the company (Linsi, 2017).

Before World War 1, the concept of investing in foreign territories started when the rich Western European countries like the United Kingdom (UK), France and Germany started investing the savings accrued from the agricultural revolution and industrialization in other territories. The savings were invested in the less developed parts of the world at the time which included the USA in North America, South America and South Africa in Africa. The idea was premised on establishing a win-win situation wherein the capital exported to the less developed countries would attract a healthy return for the rich countries and the rich investors, while at the same time

providing the developing countries with the much needed capital to fund development activities and to close the development gap between the rich and the poor. This marked the beginning of global finance (Schularick, 2006). This trend continued albeit with intermittent changes in the direction of investment flows. The Lucas paradox explains the unexpected flow of FDI to developed countries at the expense of developing countries and this has been observed from time to time (Schularick, 2006).

2.3 Foreign Direct Investment Measurement

The definition of FDI has evolved over time and various international organisations have tried to come up with systems and approaches on how to define and compile FDI data. These organisations, among others, include notable ones like the International Monetary Fund (IMF) through their Balance of Payment Manual (BPM) series, Balance of Payments Textbook of 1996, and the Balance of Payments Compilation Guide of 1995, the Organisation for Economic Cooperation and Development (OECD) through the Benchmark Definition of Foreign Direct Investment (BD) series (UNCTAD, 2009).

The main objectives of these publications is to articulate uniform methods of defining and calculating FDI across countries and to provide basic training material to developing countries to use when setting up national accounting offices. In addition to this, the OECD's Benchmark Definition publication seeks to align the way statistics is collected and reported with the way in which MNC's operate and report on their international business activities (UNCTAD, 2009, p. 7). UNCTAD (2009) looks at inward FDI as direct investment flows and stock in enterprises within the economy and outward FDI as direct investment enterprises in other economies which report the same activities in the same currency. These activities are managed and reported as part of a country's balance of payments reporting framework (BOP). The BOP is defined as a statistical statement of a country's economic activities and transactions with the outside world in a specific period (UNCTAD, 1999). The IMF insists that for the flow and stock to be recognised s FDI for an MNC, the company must have a production site in the country or must own tangible assets like land, mines and buildings. This definition is designed to exclude flows of money into tax havens like the British Virgin Islands, Bermuda, Panama and Cayman Islands which distort the patterns (Lipsey, 2007).

The BOP statement can be split into the capital, current and financial accounts. The capital account is the one that records international capital transfers and the financial account has direct investments, portfolio investments, financial derivatives, other investments and reserve assets as its specific components (UNCTAD, 2009). These statements record FDI flows and stock accumulation over time including the retained income in the books of foreign direct investors and MNC's.

However, there are other components which constitute FDI which are not included in the national accounts because they are difficult to measure and these include technological knowledge transfer, ideas, research and development, and organisational knowledge (Lipsey, 2007).

2.4 Economic Growth

Economic growth is measured in terms of the quality of life of the people living in a specific political jurisdiction. An economy is said to be growing if unemployment levels are reducing, and

income and consumption levels are increasing (Sharipov, 2015). While it is relatively easy to measure economic growth, it is difficult to define its determinants. Various models have been proposed over time to try and explain the relationship between economic growth and a raft of other economic variables. These include Mercantilism, Physiocracy, Classical growth models, Innovative growth theory, Keynesian, post-Keynesian growth models, the Neo-classical growth model and the Endogenous growth model.

The Keynesian growth model recognised and included variables like National Income, National Savings, Consumption and Investments. This model emphasised the role of investment and aggregate demand in bringing about growth in an economy. John Keynes proposed that economic growth can be achieved by increasing aggregate demand in the economy. He suggested that governments could achieve this by reducing interest rates and by implementing tax reduction measures. He further proposed that investment is the main determinant of economic growth as it increases income via the multiplier effect. This investment would include both domestic and international investment (FDI) (Sharipov, 2015).

The post-Keynesians like Evsey Domar and Roy Harrod expanded the Keynesian growth model to recognise the mechanisms which actually lead to balanced economic growth. The post Keynesian growth model is also known as Domar-Harrod growth model because of the contributions of these two academics. Evsey Domar proposed that investment should be viewed as a factor that creates production capacities. In essence he was suggesting that investment will lead to growth in income only to the extent to which it creates capacity to produce goods. This could be defined as investment efficiency. He also proposed that the growth of investment is also influenced by the marginal propensity to save (Sharipov, 2015).

Harrod's analysis concluded that the actual economic growth rate is a function of the growth rates of capital and labour productivity which is similar to the conclusion of Domar (Sharipov, 2015) in that the relationship between investment and productivity is the key indicator of economic growth.

Neoclassical growth theories as explained by Robert Solow propose that the rate of economic growth is determined by investment growth, population growth as a source of labour, and technological progress. He defined technological progress broadly to include education levels of the workers, skills growth and general improvement of organizational techniques. In essence the neoclassical growth model recognises the role of technology in economic development, a factor which was ignored by the neo-Keynesians (Sharipov, 2015). However, the impact of FDI has a short term impact as the economy will adjust to a new steady state economic development level, which in essence will not differentiate it from domestic investment (Herzer, Klasen, & Nowak-Lehmann, 2008).

The latest growth models are called the Endogenous growth models and they are quite similar in structure to the neo-classical growth models although they have different conclusions. One of the main proponents of the Endogenous growth model is Paul Romer (Sharipov, 2015). He postulated that the most important determinants of economic growth are human capital which is a function of investment in education and health, protection of property rights, investment in research and development in the science and technology sectors, and the desire to create conducive investment conditions in the economy (Romer, 1990). Xiaoying and Xiaming (2005)

suggested that FDI increases economic growth by diffusion of new technologies from the developed world to the developing world. All the stated facts are internally determined by the government and hence make a strong case for the role of government in fostering economic growth within the local economy. Further, the operation of FDI capital together with new technologies is expected to stretch the impact from short to long term, something that FDI capital alone cannot achieve (Herzer, Klasen, & Nowak-Lehmann, 2008).

Most economic models would suggest that the flow of capital into developing countries should result in substantial benefits to the receiving economies. MNCs and other players from developed countries play a leading role in introducing new managerial approaches, new skills and more advanced technologies in the host country. These interventions should ideally improve production volumes and factor productivity. Therefore, when FDI flows into an economy, in addition to capital accumulation, there are other benefits which are expected like advanced technology and managerial and technical skills that will be imported into the local economy and the spill over benefits to the domestic firms (Borensztein, De Gregorio, & Lee, 1998). However, empirical evidence seems to suggest that these benefits will not automatically result in improved growth outcomes and in some instances they seemingly resulted in negative growth. In some instances the arrival of MNCs has resulted in the closing of local companies (Schularick, 2006).

The dependency theory suggests that developing countries tend to export unprocessed primary goods to the countries in the developed world. In turn these countries then process these into more expensive products and technologies which are then exported to the developing countries at very high prices. In essence the developing countries will never be able to pay for these technologies using primary goods export receipts (Institute for New Economic Thinking, 2017). This theory casts doubts on the benefits of imported technologies and human capital in fostering economic growth in developing countries because of the price disparities.

2.5 Empirical Results of the relationship between FDI and Economic Growth

In order to understand the relationship between FDI and economic growth better, empirical studies have been done in which other variables were included which were thought to have an impact on the dynamics of how FDI actually works in the receiving country.

Edwards (2001), using cross country data sets split into emerging economies on one hand and developed economies on the other. He investigated the effects of capital mobility on economic growth and concluded, in broad terms, that economies with more open capital accounts outperformed countries with restrictive capital mobility policies. Importantly, the same investigation noted that there seemed to be a threshold level of economic development that an economy had to reach before capital inflows could result in significant and positive economic growth. In essence, for economies below a certain threshold of development, capital inflows or FDI could result in negative growth or insignificant economic growth (Edwards, 2001).

In his quantitative analysis Edwards (2001) included an indicator for domestic financial development represented by the ratio of liquid liabilities in the banking sector to GDP, an investment ratio, an indicator for capital account openness per country, an indicator for human capital development represented by the number of years of schooling completed, and real GDP per capita and he used the weighted least squares regression analysis technique to derive the relevant coefficients and other statistics for interpretation. His conclusion was that for foreign

investment to drive growth, the local economy must be prepared by developing the financial market system and investing in human capital development (Edwards, 2001).

The movement of capital into an economy is also associated with financial crises which result in significant reversals of economic growth fortunes, if there is a sudden withdrawal of capital by foreign investors. The Asian crises which afflicted countries like Indonesia, Malaysia, South Korea, Thailand and Philippines in 1997 was reportedly caused by a rapid inflow of capital in 1997 which was followed by a rapid withdrawal of capital in the same year (Bhagwati, 1998). In essence the flow of FDI into an economy might be the precursor of a financial crisis if the inflows are not sustained. Regrettably the withdrawal of capital in most instances will be a result of changes in global factors like the Federal interest rate in the USA, which are beyond the control of the recipients of FDI. Financial crises dampen economic development and tend to continue for prolonged periods as it takes time to restore investor confidence. According to Bhagwati (1998), the debt crisis that hit South America in the 1980's cost them almost ten years of growth.

Xiaoying and Xiaoming (2005) commissioned a study to investigate the impact of FDI on growth by tracking a panel of 84 countries over a 30-year period (1970-1999). They included investment, population growth, initial human capital, initial per capita GDP, technology gap, infrastructure per capita, interest rates, inflation rates, political stability indicators, and a black market premium in the model. The researchers included the interactions of FDI with human capital and the technology gap as way of assessing the absorptive capacity of the local economy. In the study they also tested for endogeneity of FDI and economic growth as this may result in biased coefficients as the two variables can start complementing one another over time. This was tested using the Durbin-Wu_Hausman test (Xiaoying & Xiaming, 2005). The study concluded that FDI has a positive impact on economic growth both directly and indirectly. There was a significantly positive interaction effect with human capital and a negative interaction effect with the technology gap in developing countries.

In a study covering a total of 28 developing countries, Herzer, Klasen and Nowak-Lehmann (2008) assessed data from 28 developing countries picked from Latin America, Asia and Africa. The study used a single equation and system co-integration method and the variables considered are GDP, FDI/GDP where GDP figures are net of capital flows giving the foreign owners less than 10% of the voting stock in an enterprise. The paper suggested that FDI, in most cases, was far too small and insignificant when compared to the GDP such that its impact would be rendered negligible and statistically insignificant. The conclusion was that in the majority of countries covered in the study there was no evidence that FDI had a long term or even a short term impact on GDP (Herzer, Klasen, & Nowak-Lehmann, 2008).

Bhagwati (1998) proposed that the trade policy or strategy adopted by the recipient country has a bearing on the relationship between FDI and economic growth. He suggested that countries that follow an export promotion (EP) trade strategy are better positioned to convert FDI into economic growth as compared to countries that follow import substitution (IS) trade strategies. This was based on the inefficiencies associated with the IS strategy: reliance on tariffs and quotas, does not consider comparative advantage in identifying goods for production and hence the economy ends up producing goods that are not supported by the country's factor endowment.

On the other hand, EP trade strategies are founded on comparative advantage as the basis of choosing goods to be produced for export which promotes allocative efficiency (Balasubramanyam, Salisu, & Sapsford, 1996). (Balasubramanyam, Salisu, & Sapsford) (1996) assessed data from 46 countries using the ordinary least squares regression analysis. They split the data set into EP countries and IS countries based on their trade policies. The research established that in countries where FDI was directed towards EP investments, FDI is a significant determinant of economic growth, outperforming domestic investment. They also established that in countries where FDI was directed towards IS, FDI had no significant influence on economic growth. Their research confirmed the proposition made by Bhagwati (Balasubramanyam, Salisu, & Sapsford, 1996).

Durham (2004) concluded that there seems to be threshold levels of development of financial systems and human capital that an economy should reach to achieve significant positive correlation between capital flows (FDI) and economic growth and that the relationship between FDI and growth is not a straight forward one. The research used a number of models, and some of them included products of the FDI and financial system development and human capital indicators. This was done to assess the influence of financial system development and levels of human capital development on the economy's ability to absorb and convert FDI into economic growth. Some emerging economies have more developed financial markets and higher human capital endowment and hence stand a better chance of converting the FDI into tangible economic growth. Durham (2004) contends that developed financial markets improve the economy's allocative efficiency in distributing available capital into productive projects. An educated human capital base will have the ability to make use of the new technologies that FDI will bring into the economy. Some research has also shown that the initial level of development of an economy also has a bearing on the country's ability to absorb FDI (Mello L. d., 1999). If a country is too poor from an economic development perspective then the ability of that country to absorb FDI and convert it into economic growth tends to be very low.

2.6 Conclusion

A review of the literature of the relationship between FDI and economic growth shows that by nature this relationship depends on other factors and variables operating within an economy. In some economic set ups FDI seemingly produced negative growth, in some instances the impact was not significant, while in other cases the impact was positive. In order to understand whether FDI is having an impact in particular economy or region, there is need for an in depth study of this relationship in empirical terms and in the process including key variables to understand how these can aid economic development. Importantly, it appears that for an economy to achieve maximum growth from the FDI flows, governments will need to carefully understand that positive economic growth is not a guaranteed outcome. The next chapter will review the various methods that will be used to quantify the impact of FDI on economic growth as well as the impact of the absorptive capacity variables.

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter reviews the random and fixed effects panel regression techniques for analysing pooled econometric data recorded over a period of time. The review also looks at diagnostic test methodologies that are relevant to this study where we are assessing the impact of FDI on GDP using data from 8 countries over a period of 16 years.

3.2 Data

This research uses annual economic data sourced from the World Bank's Development Indicators and the United Nations Development Programme (UNDP) for the years 2000-2015 for the following eight countries in southern Africa:

- Botswana
- Lesotho
- Malawi
- Mozambique
- Namibia
- Swaziland
- South Africa
- Zambia

Zimbabwe was excluded from the research as it did not have the relevant economic and financial data and indicators for the years when it was experiencing hyperinflation and economic instability. While there are methods that can be used to analyse unbalanced panel data, that would introduce complexity to the process and the interpretation of the output compromising the conclusions. Given that all the other countries had complete data sets, it would have been imprudent to change the methodology in order to include only one additional country.

The UN geographic grouping includes only five countries in southern Africa, and these are South Africa, Lesotho, Swaziland, Botswana and Namibia only (UNCTAD, 2009). Malawi, Mozambique and Zambia were added because of their membership of SADC and close historical ties with the above mentioned countries. DRC and Angola could not be added because during the period covered by this research, they experienced significant political instability.

The countries that were included in the research are all developing countries in southern Africa and, to a large extent, share a common history and culture. All these countries are members of the regional grouping called the Southern African Development Community (SADC). The Republic of South Africa is the biggest economy in this group and could potentially crowd out the other countries in the quantitative analysis. This research, however, made use of ratios and percentages to deal with the scale differences in the variables.

3.3 Variables

The two key variables in the analysis – FDI and economic growth were defined and measured as follows:

GDP: The annual percentage growth rate of the country's GDP at market prices based on constant local currency, however the aggregates are based on constant 2010 US Dollar. It is the sum of the gross value added by all the producers' resident within the country adding any taxes and less all the subsidies not included in the value of the products but excluding any depreciation and charges for all the assets and stocks including natural resources. This is the dependent variable in the regression model (The World Bank, 2017).

FDI: The net inflows of FDI into the country as a percentage of GDP. The value is calculated by taking into account all the capital transactions less all the debits related to disinvestments. When there is a negative sign it implies that there were more disinvestments than investments by direct non-resident investors (The World Bank, 2017). This definition of FDI is consistent with that used by Borensztein, Gregorio & Lee (1998) in their analysis. This is an independent variable in this investigation and is generally expected to have a positive relationship with GDP growth as additional capital in an economy is intuitively expected to result in an increase in production within a country.

In order to examine the relationship between FDI and economic growth more closely, other explanatory variables were included as control variables following the various studies reviewed in the literature review section in Chapter 3. Drawing from this literature, in this research a few of those identified as important were included in the analysis. These are as follows:

Population Growth: The exponential growth rate for year t-1 to t, expressed as a percentage of the mid-year population of all residents regardless of legal status or citizenship. This variable is expected to have a positive relationship with GDP growth.

Domestic credit to private sector by banks: The amount of credit extended to the private sector by deposit taking institutions except the central bank as a percentage of the GDP per year. This will include loans, non-equity financial instruments, and trade credits (The World Bank, 2017). In this research, this variable is used as a proxy for financial system development (Herzer, Klasen, & Nowak-Lehmann, 2008) and (Azman-Saini, Law, & Ahmad, 2010). This variable is expected to have a positive relationship with GDP growth. As more financial resources are made available to the businesses in an economy, the expectation is that it will result in higher production figures. This variable can be used as an indicator for the efficiency of the financial sector (Azman-Saini, Law, & Ahmad, 2010).

Human Development Index (HD Index): It is a statistic which is calculated by assessing life expectancy, education attainment, and per capita income and is generally used to assess a country's level of human development (UNDP, 2016). The index falls in the interval -2.5 to +2.5. The HDI variable is expected to have a positive relationship with GDP growth as it is higher where people are more educated and better skilled and tend to live longer and hence have more time to add to the national production.

Interest Rate Spread: It is the interest rate charged by banks on loans to private sector customers less the interest rate paid by commercial or similar banks for demand, time or savings deposits (The World Bank, 2017). This variable will also be used as an indicator of the depth and efficiency of the financial markets in a country. Economies that have deep and efficient markets tend to have narrow interest rate spreads. On the other hand, in countries where the financial

system is inefficient, the interest rate spread tends to be very high. This variable is likely to have a negative relationship with economic growth as a wider spread suggests that capital will be very expensive for the firms and hence they will borrow less and so production will be depressed.

Internet Penetration: The number of people who have access to internet per 100 people in a country. In this research this variable is a proxy for technological development in an economy. This variable is likely to have a positive relationship with GDP growth as it is an indicator of technological development in the country.

3.4 The Panel Regression Analysis

Panel data methodology allows for the analysis of longitudinal or cross-sectional data over a time period for a number of entities. The set-up will allow the analysis of the relationship between a dependent variable and a set of independent variables by using multiple linear regression analysis methodology. A single entity which could be a country, region or person will be observed over a period of time and data related to the dependent and independent variables noted over the relevant period. This process will be applied to several other entities with the observed values being noted at the same times to provide cross-sectional views at every point in time across the entities as shown in Table 1 (Torres-Reyna, 2007). In this research, the eight southern African countries are the entities in the model and the time period is from 2000 to 2015, making use of annual data for the 16 years yielding a panel of 128. Given the information collected for the 7 variables yields a total sample of 896 observations.

Table 1 - Panel Data Matrix

Entity	Time	Dependent Variable (Y)	Independent Variables		
			X1	X2	X3
1	2001	.	.	.	.
1	2002	.	.	.	.
1	2003	.	.	.	.
1	2004	.	.	.	.
2	2001	.	.	.	.
2	2002	.	.	.	.
2	2003	.	.	.	.
2	2004	.	.	.	.
3	2001	.	.	.	.
3	2002	.	.	.	.
3	2003	.	.	.	.
3	2004	.	.	.	.

Panel data by nature allows the user to pool observations from different entities over several time periods and this will give more variability and limit the chances of collinearity among the variables. This also increases the number of degrees of freedom and makes it more efficient than other methods like time series analysis. However, individual heterogeneity, which is the variation

of a trait within an individual entity (Gimenez, Cam, & Gaillard, 2017), can be a source of concern in a panel regression. But, panel regression methods enable individual heterogeneity to be controlled for to avoid the risk of producing biased results. This can be achieved by identifying and dealing with entity-invariant and time invariant variables (Baltagi, 2005, pp. 4-7).

3.4.1 Fixed Effects Model

The fixed effects model is used if the investigation is limited to the impact of variables that change over time. Every entity has its own characteristics which are generally referred to as time-invariant variables, and these may affect the quantitative relationship between the dependent and the independent variables. The underlying assumption is that these characteristics are fixed over time like gender or culture. These variables are sometimes unobservable and introduce bias to the parameter estimates and hence there is need to control for them within the model estimation process (Baltagi, 2005, p. 12). This is achieved by taking μ_t as a fixed parameter (Baltagi, 2005, p. 12). Since every entity will have these unique characteristics, the expectation is that the error terms and the constants will not be correlated and if these conditions are met, the fixed effects model can be applied in the model estimation process to control for the unobserved heterogeneity. In other words, if the error terms are correlated then the 'fixed effects' model would not be suitable (Torres-Reyna, 2007). The fixed effects model can be represented by the following equation which controls for both entities and time:

$$Y_{it} = \alpha_i + \beta X_{it} + u_{it} \quad (3)$$

Where:

Y_{it} represents the dependent variable which is GDP growth,

α_i is the intercept for the ith entity,

β is a k x 1 vector of parameters to be estimated,

X_{it} is a 1 x k vector of observations of the explanatory variables which are domestic credit, interest rate spread, population growth, internet penetration, HDI,FDI andu_{it} is the remainder disturbance ie the error term without the effect of the time invariant variables (Brooks, 2008).

3.4.2 Random Effects Model

In the random effects model, the variation across the entities is generally assumed to be random and uncorrelated with the independent variables included in the model. Further, the model will need to include all the possible variables including the invariant time fixed characteristics otherwise the model will be exposed to bias due to omitted variables. In essence, if there is the likelihood that the differences across the entities have significant influence on the model output values for the dependent variable then one should consider using the random effects model. Therefore, one can include time-invariant variables in the model but the obvious disadvantage is that the data for such variables may not be available. The random effects model has the advantage of producing results that can be inferred beyond the sample (Torres-Reyna, 2007).

The advantage that the random effects model has over the fixed effects model is that it has less parameters and the fact that the error component is assumed to be random means that this model avoids losing degrees of freedom (Baltagi, 2005, p. 14).

The following model represents a random effects panel data regression model:

$$Y_{it} = \alpha + \beta_{1,it}X_{1,it} + \cdots + \beta_{k,it}X_{k,it} + U_{it} + \varepsilon_{it} \quad (4)$$

Where:

ε_{it} is the error term for the within-entity error for the ith independent variable at time t;

U_{it} is the error term for the between –entity error for the ith independent variable at time t (Torres-Reyna, 2007).

3.5 Model Specification Test

Brooks (2008, p. 500) suggests that the random effects model is suited to the scenario where the data is a random sample from the population, whereas the fixed effects model would be suited in instances where the whole population data are included in the quantitative computation. In the same instances, Brooks (2008) suggests that the random effects model cannot produce valid results if the error term is correlated with any of the explanatory variables. In the event that these are correlated then the fixed effects model can be applied instead.

The decision to use either the fixed effects model or the random effects model can be made by applying the Hausman test (MacManus, 2011). It essentially tests whether the parameter estimates of the coefficients of the variables for the two methods are significantly different. As mentioned above, the fixed effects approach controls for endogeneity by removing the effect of the time-invariant characteristics which include unobserved time varying effects, time varying measurement errors and feedback loops (MacManus, 2011). Although this process yields consistency it comes at a cost as efficiency is lost. Fixed effects models produce estimates with higher standard errors with a loss in the degrees of freedom (Baltagi, 2005, p. 14). When applying the Hausman test the null hypothesis is that there is no difference in the coefficients under the two methods and if it is not rejected then there is no reason to use the fixed effects model.

Durham (2004) adjusted his models to assess the interaction of FDI with other variables and how that impacts the ability to absorb and convert FDI into economic growth. This was done by adding the absorption variable as a product of the interaction variable with FDI. This was then added to the model as an additional variable.

3.6 Diagnostic Analysis

Panel data regression analysis data should be checked for endogeneity, multicollinearity, stationarity, autocorrelation, goodness of fit and the significance of the individual variable coefficients before the results can be deemed usable and reliable.

3.6.1 Endogeneity

Endogeneity exists when there is correlation between the explanatory variables and the error terms. This could be caused by omitting some variables in the model, autocorrelation in time series data or errors in measurement. It introduces inconsistency in the model estimates of the

coefficients of the explanatory variables (Baltagi, 2005). Borenzstein, De Gregolio and Lee (1998) suggested that if there are some omitted variables that have a positive impact on the return on capital, they will have a positive impact on both the flow of FDI and the growth rates simultaneously. Such a scenario would result in the entity specific error term correlating with the FDI variable and this biases the coefficients that are estimated.

Endogeneity can be assessed by a test proposed by Ahn and Low (1996) which can be applied when the data is non-stationary (Baltagi, 2005). Where endogeneity is detected, lagging the main explanatory variable can be a solution for endogeneity (Ruey-Jer, Ziliang, Daekwan, & Xiaohui, 2016). The fixed effects panel regression model controls for endogeneity bias between the dependent variable and the explanatory variables (MacManus, 2011)

3.6.2 Multicollinearity

Multicollinearity occurs when two or more explanatory variables have a certain degree of association or correlation. This level of association could be described as negligible, near or perfect multicollinearity. The presence of multicollinearity as indicated by very high collinearity results in a superficially high coefficient of determination (R-squared) and coefficients with very high standard errors. The high standard errors will affect the results of any hypothesis test on the data.

A correlation matrix can be used to detect pairwise correlation. In the event that there are variables that are highly correlated, the researcher has an option to drop one of the variables or to use ratios of the variables as opposed to the absolute values (Brooks, 2008, p. 172).

3.6.3 Stationarity

Time series data is said to be stationary if the variance remains constant over time. If the variance exhibits a non-uniform pattern over time, the data is considered to be non-stationary and this results in inconsistent coefficient estimates if panel regression techniques are applied. This happens because a shift in time would result in a different shape of the distribution. The presence of unit roots is one of the causes of non-stationarity in time series data. The unit root tests like the Fisher type Augmented Dickey-Fuller (ADF) test or the Levin-Lin-Chu (LLC) unit root test can be used to assess whether the data is stationary or non-stationary. The null hypothesis is that the observed data of a specific variable follows a unit root process (Baltagi, 2005).

The LLC unit root test produces a bias adjusted t-statistic that has an asymptotically normal distribution. In this instance, where the countries included in the data are from the same region it is imperative to deal with cross-sectional correlation when testing for stationarity and that can be achieved by using the LLC unit root test version that removes the cross-sectional averages from the data (Stata Corporation (US)).

3.6.4 Autocorrelation/ Serial Correlation

The relationship that exists between an error and the immediate previous error in time series data is called first order correlation. The relationship can be positive or negative while in some instances there might not be any relationship at all. Ignoring autocorrelation could lead to inefficient parameter estimates which may lead to the incorrect analysis of a variable's contribution to the variation in the dependent variable (Brooks, 2008). In fact, auto correlated

residuals can result in inflated values of the coefficient of determination. In addition, autocorrelation can introduce bias in the standard errors (Drukker, 2003).

The Durbin-Watson and the Breusch-Godfrey tests can be used to test for autocorrelation. The Durbin-Watson test is designed to deal with first order autocorrelation which is related to the relationship between the residuals U_t and U_{t-1}. On the other hand, the Breusch-Godfrey test will extend to the rth order by testing the relationship between the residuals U_t and all the values down to U_{t-r} which makes it a general test (Brooks, 2008, p. 148). Drukker (2003) proposes the Wooldridge test for autocorrelation as it can be applied under general conditions and is relatively easy to use.

3.7 Conclusion

The quantitative analysis of panel data in this research went through various stages: from descriptive data analysis of the available data and variables, panel regression using the fixed effects and random effects models, model specification test to choose between the two models and finally the diagnostic tests. The research also added some compound variables to assess how the interaction of the variables affects the GDP growth outcomes. One of the research objectives is to assess the impact of other variables on the ability of the economy to convert FDI into economic growth. The product of FDI and Domestic Credit variable was used together with the product of FDI and the HDI variable (Borensztein, De Gregorio, & Lee, 1998). The next chapter looks at the actual results from the methodology described in this chapter and a high level analysis of these results.

4 RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter looks at the results from the panel regression for both the random and fixed effects regression techniques. The results of the diagnostic tests are also presented including the relevant tables and graphs.

4.2 Descriptive statistics

The data were analysed using Stata and the basic statistics to describe the data were calculated. Specifically, the mean, minimum, maximum, standard deviations and the coefficients of variation were calculated as shown in Table 2 for the pooled cross sectional data across the eight countries. The coefficient of variation (CV) is calculated by dividing the standard deviation by the mean of the data of every variable. The coefficients of variation (CV) are very high as they are mostly above fifty percent except for the human development index and population growth. The internet penetration and the FDI variables have CVs above 100 percent, implying higher volatility. This high volatility could affect the consistency of the coefficients of the pooled data.

The mean values are all positive indicating in loose terms that over the relevant period GDP growth was positive at 4.8 percent annually and the populations grew at approximately 2 percent annually. The interest rate spread averaged 9.4 percent in the region and this is very high when compared to 2 percent in USA. This is an indication of the differences in depth and efficiencies of the financial markets between developed countries and developing countries in southern Africa.

Table 2 - Descriptive Pooled Data Summary

Variable		Mean	Std. Dev.	Min	Max	CV (%)
GDP Growth (%)		4.7829	2.9985	-7.6523	12.721	62.7
Domestic Credit (%)		25.6384	20.6937	2.7469	78.2941	80.7
Interest Rate Spread		9.4375	6.4999	3.03	32.7925	68.9
Population growth (%)		1.9711	0.7783	0.596	3.0613	39.5
Internet Penetration (%)		8.6364	10.6705	0.1096	51.9191	123.6
HD Index		0.5167	0.1002	0.298	0.698	19.4
FDI (%)		5.0309	6.391	-2.7389	41.8096	127.0

4.3 FDI and GDP Growth

The graphs for the GDP growth statistics for the different countries from 2000 to 2015, as shown in Figure 1, reveal that GDP growth in the countries covered by this study was generally positive. South Africa and Botswana registered negative growth in 2009 presumably because of the global recession. Some of the other countries experienced lower than normal GDP growth in the same period.

Figure 1 - The GDP growth statistics by country (2000-2015)

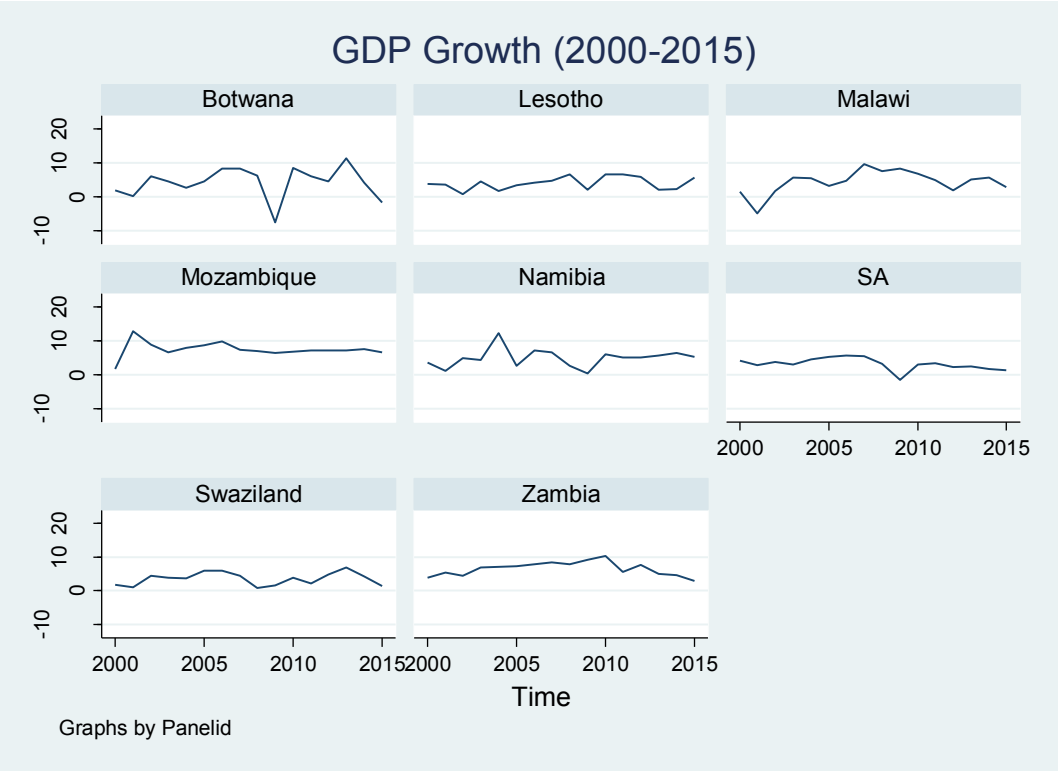
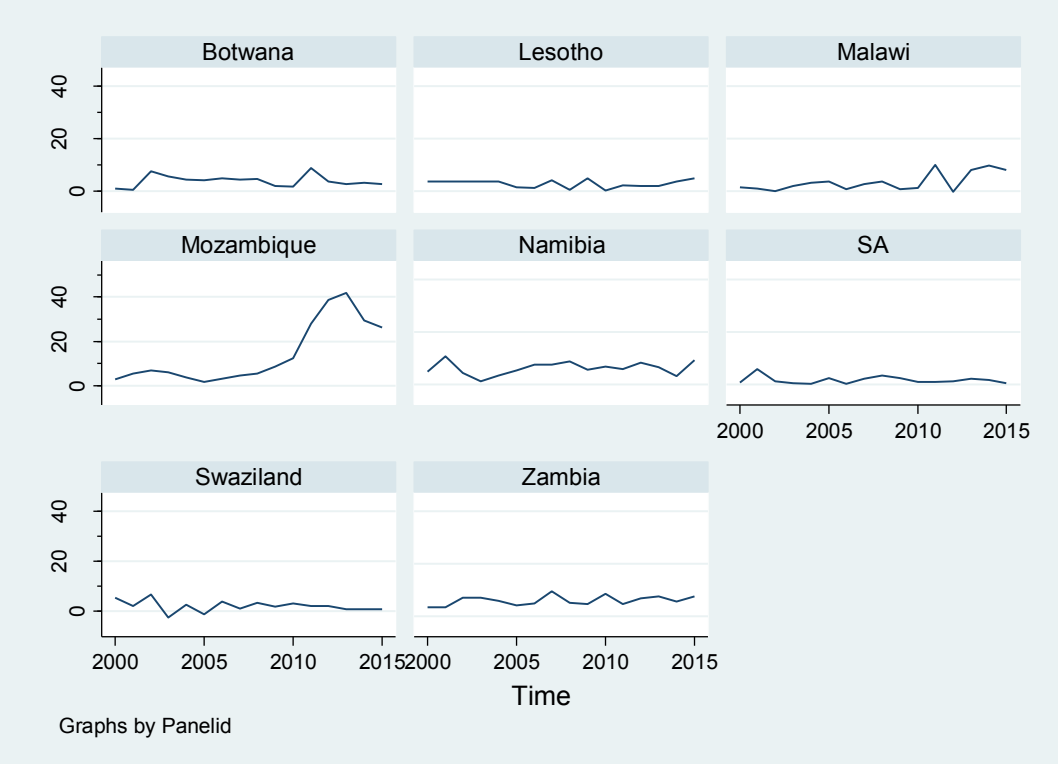


Figure 2 - FDI per country (2000-2015)



The FDI levels for the countries vary between 0 and 10 percent of GDP with the exception of Mozambique which climbed from around 10 percent in 2009 to more than 40 percent in 2013, as shown in Figure 2. Swaziland recorded negative FDI in 2003 and 2005. A negative FDI position implies that there was reverse investment or disinvestment by foreign investors which was more than the investments and so the net position is negative.

4.4 Multicollinearity

An analysis of the pairwise correlation coefficients in the matrix presented in Table 3 shows that none of the variables have very high correlation coefficients. The highest correlation is 0.6823 between the HD index and the domestic credit from private banks. There is no intuitive relationship between these variables as one is a social variable and the other is a banking variable and hence the correlation between the two could be considered as spurious. As a result, none of the explanatory variables will be dropped on account of multicollinearity. However, it should be noted that the correlation coefficient is just a good indicator of the presence of collinearity among variables and is not definitive in terms of proving the presence of multicollinearity (Brooks, 2008, p. 172).

Table 3 - Pairwise Correlation Coefficients

Variables	GDP Growth	Domestic Credit	Interest Rate Spread	Population growth	Internet Penetration	HD Index	FDI
GDP Growth	1						
Domestic Credit	-0.184	1					
Interest Rate Spread	0.0865	-0.5704	1				
Population growth	0.3223	-0.3759	0.533	1			
Internet Penetration	-0.183	0.4785	-0.3888	-0.1165	1		
HD Index	-0.219	0.6823	-0.5429	-0.4511	0.5724	1	
FDI	0.2399	-0.0159	-0.0496	0.3496	-0.0679	-0.1963	1

4.5 Stationarity and Unit Root Tests

As documented in chapter 3, the LLC test was performed on all the variables to assess whether the variance of the data is uniform over time. The presence of a unit root in the data signifies the non-stationarity of the data. The null hypothesis of the LLC unit root test is that the panel contains a unit root and therefore the variable is non-stationary. The alternative hypothesis is that, the panel is stationary. Given that the countries are all from the same region, an adjustment has to be made for cross sectional correlation by removing cross sectional averages.

Table **4** shows the output from the LLC test which included the panel means with no trend for the GDP growth variable. The test statistic, which is the adjusted t-value, is -3.771 with a p-value of 0.0001 falls in the rejection region. Table 5 shows the adjusted t-values and the p-values for all the variables. At the 5 percent level of significance, domestic credit, the interest rate spread,

population growth, HDI and GDP growth are considered to be stationary as the p-values are less than 0.05 and thus the null hypothesis can be rejected. Internet penetration and FDI, in contrast, are considered to be non-stationary as the p-value is greater than 0.05 and thus the null hypothesis cannot be rejected.

Table 4 - The Levin-Lin-Chu Unit Root Test

Levin-Lin-Chu unit-root test for gdpgrowth		
Ho: Panels contain unit roots	Number of panels = 8	
Ha: Panels are stationary	Number of periods = 16	
AR parameter: Common	Asymptotics: N/T -> 0	
Panel means: Included		
Time trend: Not included	cross sectional means removed	
ADF regressions:1.38 lags average (chosen by AIC)		
LR variance: Bartlett kernel, 8.00 lags average (chosen by LLC)		
	Statistic	p-value
Unadjusted t	-8.1996	
Adjusted t*	-3.7701	0.0001

Table 5- The LLC Test Statistics and p-values

Variable	Adjusted t*	P-value
Domestic Credit	-1.9066	0.0283
Interest Spread	-1.6941	0.0451
Population Growth	-10.8448	0
Internet Penetration	1.9389	0.9737
HDI	-5.8365	0
FDI	-1.522	0.064
GDP growth	-3.7701	0.0001

4.6 Autocorrelation/Serial Correlation

The Wooldridge autocorrelation test was applied to the panel data to test the null hypothesis that there is no first order autocorrelation in the residuals of the GDP growth model. The results of the test in Stata are shown in **Table 6**. Since the p value is greater than 0.05, the null hypothesis cannot be rejected and hence it can be concluded at the 5 percent level of significance that there no first order correlation in the panel data used in this research.

Table 6 - Wooldridge Test for Autocorrelation

Wooldridge test for autocorrelation in panel data
Ho: no first order autocorrelation
F(1,7) = 5.057
Prob>F = 0.0593

4.7 The Random Effects Model Results

The first differences for the internet penetration and FDI variables were used in the regression models to account for the non-stationarity identified. According to the results tabulated for the random effects model, the coefficients show that there is a positive relationship between GDP growth and population growth and FDI as expected. GDP growth has a negative relationship with domestic credit to the private sector by banks, the interest rate spread, and surprisingly internet penetration and HDI. However, at the 5 percent level of significance, none of the variables are statistically significant as all the p-values are greater than 0.05.

The coefficient of determination, as given by the R-squared with an estimate of 0.1388, is quite low. This estimate is preferred as it is the equivalent of the R-squared value from the Ordinary Least Squares (OLS) model (Vijayamohanan, 2016).

Table 7 - Random Effects Model Results

Random-effects GLS regression				Number of obs = 127				
Group variable: country				Number of groups = 8				
R-sq: within = 0.0019				Obs per group		min=15		
R-sq: between = 0.7243						avg=15.9		
R-sq overall = 0.1388						max=16		
				Wald chi2(6) = 5.15				
corr(u_i,X) = 0 (assumed)				Prob > chi2 = 0.5244				
gdpgrowth	Coef.	Std Err		z	P>|z|	[95% Conf. Interval]		
Domestic Credit	-0.0168189	0.028399		-0.59	0.554	-0.07248	0.038842	
Interest Spread	-0.0379754	0.0710328		-0.53	0.593	-0.1772	0.101246	
Population Growth	0.942717	0.5413499		1.74	0.082	-0.11831	2.003743	
D.Internet Penetration	-0.0041058	0.0307174		-0.13	0.894	-0.06431	0.056099	
HDI	-1.500888	5.565652		-0.27	0.787	-12.4094	9.40759	
D.FDI	0.0087917	0.0346242		0.25	0.8	-0.05907	0.076654	
_Cons	4.518412	3.029079		1.49	0.136	-1.41847	10.4553	
sigma_u	1.0022666							
sigma_e	2.7832362							
rho	0.11479202	(fraction of variance due to u_i)						

4.8 The Fixed Effects Model Results

When the fixed effects panel regression model is applied to the data in Stata, GDP growth is shown to have a positive relationship with the interest rate spread, HDI and negatively with FDI, internet penetration, population growth and domestic credit by banks to private sector. As with the random effects model, however, all the coefficients are insignificant at the 5 percent level as shown by the p-values for all the coefficients in **Table 8**.

The coefficient of determination as given by R-squared is very low at 0.0474 and much lower compared with the R-squared value from the random effects model as calculated in Table 7.

Table 8 - Fixed Effects Regression Output

Fixed -effects (within)				Number of obs = 127				
Group variable: country				Number of groups = 8				
R-sq: within = 0.0154				Obs per group		min=15		
R-sq: between = 0.3062						avg=15.9		
R-sq overall = 0.0474						max=16		
				F(6,114) = 0.30				
corr(u_i,Xb) = -0.8300				Prob > chi2 = 0.9380				
gdpgrowth	Coef.	Std Err		t	P>|t|	[95% Conf.	Interval]	
Domestic Credit	-0.054792	0.0708303		-0.77	0.441	-0.19512	0.085536	
Interest Spread	0.0542491	0.0970003		0.56	0.577	-0.13793	0.246424	
Population Growth	-0.746338	1.129378		-0.66	0.51	-2.98384	1.491163	
D.Internet Penetration	-0.0013875	0.0312633		-0.04	0.965	-0.06333	0.060551	
HDI	13.98798	11.06069		1.26	0.209	-7.92525	35.90121	
D.FDI	-0.0048568	0.0365706		-0.13	0.895	-0.07731	0.067596	
_Cons	-0.0625611	4.676867		-0.01	0.989	-9.32828	9.203157	
sigma_u	2.4111016							
sigma_e	2.7832362							
rho	0.42872347	(fraction of variance due to u_i)						
F test that all u_i=0		F(7,114) = 1.63		Prob > F= 0.1334				

4.9 The Hausman Specification Test

The panel data was subjected to both the fixed effects and random effects panel regression modelling. The coefficients were then subjected to the Hausman test to check whether the coefficients from both methodologies are consistent or whether there is a systematic difference between the coefficients. The test assumes that the difference between the coefficients is not systematic. The test produces a chi-square value of 7.42 which gives a p-value of 0.2835 which is the acceptance region at the 5 percent level of significance. We therefore accept the null hypothesis and conclude that the two models produced coefficients with differences that are not systematic. Hence the random effects model is used in the analysis as the fixed effects model is not adding significant value as the coefficients it is producing are not significantly different from the coefficients produced by the random effects model (See **Table 9**).

Table 9 - Hausman Specification Test Output

Hausman Test: fixed random				
	(b)	(B)	(b-B)	
	Fixed	Random	Difference	S.E.
Domestic Credit	-0.054792	-0.0168189	-0.037973	0.064888
Interest Spread	0.0542491	-0.0379754	922245	0.066056
Population Growth	-0.746338	0.942717	-1.689055	0.991178
D.Internet Penetration	-0.0013875	-0.0041058	0.0027183	0.005817
HDI	13.98798	-1.500888	15.48887	9.55837
D.FDI	-0.0048568	0.0087917	-0.0136485	0.011772
	b = consistent under Ho and Ha; obtained from xtreg			
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
chi2(6) = 5.79	Prob > chi2	0.4473		
(V_b-V_B is not positive definite)				

4.10 The Random Effects Models with Absorptive Capacity Variables

The random effects model was adjusted by adding absorptive capacity variables. These variables were created by finding the product of FDI with HDI and FDI with Domestic Credit variables. Table 10 show the results for the random effects model.

Table 10 - Random Effects With Absorptive Capacity Variables

Random-effects GLS regression				Number of obs = 127			
Group variable: country				Number of groups = 8			
R-sq: within = 0.0005				Obs per group		min=15	
R-sq: between = 0.8496						avg=15.9	
R-sq overall = 0.1498						max=16	
				Wald chi2(6) = 20.79			
corr(u_i,X) = 0 (assumed)				Prob > chi2 = 0.0077			
gdpgrowth	Coef.	Std Err		z	P>|z|	[95% Conf.	Interval]
Domestic Credit	-0.0129629	0.0189977		-0.68	0.495	-0.0502	0.024272
Interest Spread	-0.0934042	0.0574187		-1.63	0.104	-0.20594	0.019134
Population Growth	1.380089	0.4245183		3.25	0.001	0.548049	2.21213
Dinternet	-0.0031909	0.0311525		-0.1	0.918	-0.06425	0.057867
hdi	-2.800653	3.9099		-0.72	0.474	-10.4639	4.862609
Dfdi	-0.0377043	0.1511831		-0.25	0.803	-0.33402	0.258609
Dfdi*hdi	0.0721038	0.3214161		0.22	0.822	-0.55786	0.702068
Dfdi*Domestic Credit	0.0005619	0.0020448		0.27	0.783	-0.00345	0.00457
_Cons	4.790778	2.213754		2.16	0.03	0.4519	9.129656
sigma_u	0						
sigma_e	2.799002						
rho	0	(fraction of variance due to u_i)					

The coefficients for the absorptive capacity variables for FDI with HDI and FDI with Domestic credit are positive. All the variables except for population growth are insignificant at the 5 percent level as shown by the p-values which are greater than 0.05.

The coefficients of the absorptive capacity variables show that the level of human capital development and the level of development of the financial system in an economy have a bearing on the economy's ability to absorb and convert FDI into economic growth.

The same model was re-run with one absorptive capacity variable in turn. The table in Appendix 2 shows the output of the random effects model with the absorptive capacity variable for FDI with domestic credit. The coefficient for this variable is positive but not significant.

The table in Appendix 3 shows the results for the case where the absorptive capacity variable is FDI with interest rate spread. The coefficient for this variable is negative but not significant. It is negative because the relationship between interest rate and GDP growth is expected to be negative.

The table in Appendix 4 shows the results of the model having the absorptive capacity variable for FDI with HDI. As shown in the table, the coefficient for population growth is significant at 5 percent level and the coefficient of interest rate spread is significant at the 10 percent level. The absorptive capacity variable is positive as expected but not significant statistically.

5 RESEARCH CONCLUSIONS

5.1 Introduction

This chapter presents the findings and the policy recommendations based on the results of the data analysis presented in chapter 4. The discussions in the literature review in Chapter 2 and the methodology used as described in chapter 3 are used to give context to these findings and policy recommendations.

5.2 Research Conclusion

This study tests the hypothesis that FDI inflows into an economy will result in economic growth as measured by GDP. When investors invest in foreign territories they also bring new technology and new management techniques and skills and access to international markets. When the economic growth theories as described in chapter 2 are applied, these FDI inflows are expected to increase production and productivity in the local economy. On the other hand these new investments can kill the domestic sector leading to job losses, and rapid withdrawal of capital can also lead to economic crises and negative economic growth. These contradictions and the different economic and social conditions in different countries and regions require empirical analysis to ascertain the impact of FDI in their jurisdictions using data collected in the relevant countries.

Based on the current findings, this study concludes that FDI has no relationship with GDP growth, because the level of growth was not significant in statistical terms as the relevant coefficient is not significantly greater than zero for the eight countries over the 16 year period.

Population growth showed a positive relationship with GDP growth and this coefficient was significant at the 5 percent level. This implies that when a country or political region has a big population it has a positive impact on economic growth prospects. This could be explained by the fact that the bigger the population the bigger the market for goods and the greater the demand. When there is demand in an economy it attracts both domestic and foreign investment and that is likely to result in an increase in production. In essence bigger populations are associated with better growth prospects.

A high HD Index is ordinarily associated with higher education attainment, higher life expectancy and higher income levels. A high HDI index is associated with good prospects for economic growth to be achieved. A highly skilled workforce has a higher labour productivity but surprisingly in this instance the HDI coefficient is negative.

On the other hand domestic credit to private sector by banks, interest rate spread, and internet penetration had negative coefficients which are not significant statistically and hence the conclusion is that there is no evidence of a relationship between GDP growth and domestic credit, internet penetration and interest rate spread. Developed economies have a smaller spread when compared to developing countries and this is a reflection of the depth and efficiency of the financial systems. The higher spread implies that the cost of capital is much higher and hence firms will find it more costly to get loans to finance capital requirements and this will lead to lower economic growth as expected by the economic growth theories.

The negative coefficients for internet penetration and domestic credit are counter intuitive even though they are not statistically significant. Internet penetration as an indicator or proxy for technological development should have had a positive relationship with GDP growth. The introduction of internet has reduced the transaction costs across the globe as it is easier and faster to communicate and to make business payments. However, it can also be noted that the

advent of internet has seen the demise of other traditional industries like postal services and this might have an impact on employment.

The higher the level of domestic credit to private sector from banks, the higher the allocative efficiency of capital resources in the economy. When banks lend money to firms they vet the firms first and they normally offer continuous assessments and support to ensure that the business survives long enough to repay the loan. This should result in higher production and economic growth. In this instance the coefficient is negative but not significant statistically and hence the conclusion is that there is no relationship between GDP growth and the level of domestic credit being extended to the private sector by banks.

When FDI is interacting with the human capital development variable (HD Index) it showed a positive relationship with GDP growth as shown in equation 5. The same process produced a positive relationship when FDI was interacting with domestic credit to private sector by banks. However, all these absorptive capacity variables were not significant statistically and hence the conclusion is that there is no evidence that any of these interactions are having a positive or negative impact on GDP growth in the southern African countries included in this study.

The above results are consistent with the results from studies by Herzer, Klasen Nowak-Lehmann et al (2008) who based their studies on 28 developing countries. The factors that might have led to the above conclusion could be related to the fact that the amount of FDI as a proportion of GDP is generally low at an average of 5 percent for the relevant period. This could be too low to have a significant impact of economic growth.

Further, the impact of FDI could differ by sector. The impact on the manufacturing sector, mining and agriculture or telecommunications sectors could yield different results individually but being netted off by aggregation of the results nationally (Herzer, Klasen, & Nowak-Lehmann, 2008).

5.3 Policy Recommendation

This research has concluded that population growth is the only variable that has a positive and significant relationship with GDP growth. All the other econometric variables including FDI did not show any evidence of having an impact on GDP growth in the southern African countries covered in this research.

Most countries in southern Africa have very small populations and hence from a market perspective they offer very little in terms of business opportunities. If these countries pursue regional integration they can present themselves as an integrated population with a big population which translates to a big market for business. Therefore, the governments in the SADC region should prioritize regional integration as a policy measure to improve the economic growth prospects of their countries.

6 RECOMMENDATIONS FOR FUTURE RESEARCH

The impact of FDI on GDP growth is an important discussion in our contemporary society as it is on the agenda of economic development discourse in the developing world. It is therefore imperative that further research be undertaken to ascertain the nature of the relationship between these two variables.

Furthermore, research should be directed at examining whether there is a bi-directional causality between FDI and GDP growth. This will help researchers understand the mechanisms underpinning economic development in the southern Africa region.

The injection of FDI might have different results on different sectors of the economy and hence future research could be directed at assessing its impact on individual sectors without aggregating nationally.

The issue of initial level of development was included in some studies of the same topic as alluded to in chapter 2. However, there is no scientific or objective method available to pick a common year for a panel of countries that can be labelled as a plausible starting point. Most countries in the SADC region attained independence at different points in time and hence their initial starting points will be different. Therefore there is need to assess the concept of initial level of development when dealing with panel data.

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APPENDICES

Appendix 1 – The Total FDI Net Inflows in US$'m at Current Values

Year	Total FDI -Net inflows US$ m
2000	1 632.32
2001	8 159.10
2002	2 808.55
2003	1 999.63
2004	2 157.68
2005	7 936.35
2006	2 767.82
2007	9 729.31
2008	13 047.87
2009	10 500.09
2010	7 428.77
2011	12 066.94
2012	13 704.02
2013	18 799.77
2014	13 977.76
2015	9 498.11

Appendix 2 - The Random Effects Model with Absorptive Capacity Variable for FDI with Domestic Credit

Random-effects GLS regression			Number of obs = 127				
Group variable: country			Number of groups = 8				
R-sq: within = 0.002			Obs per group		min=15		
R-sq: between = 0.8489					avg=15.9		
R-sq overall = 0.1494					max=16		
			Wald chi2(6) = 20.91				
corr(u_i,X) = 0 (assumed)			Prob > chi2 = 0.0039				
gdpgrowth	Coef.	Std Err	z	P>|z|	[95% Conf. Interval]		
Domestic Credit	-0.0129142	-0.0189205	-0.68	0.495	-0.05	0.024169	
Interest Spread	-0.089765	0.0548592	-1.64	0.102	-0.19729	0.017757	
Population Growth	1.347096	0.396636	3.4	0.001	0.569704	2.124489	
Dinternet	-0.0034741	0.0310025	-0.1	0.911	-0.06424	0.05729	
hdi	-2.77609	3.89274	-0.72	0.476	-10.4057	4.85354	
Dfdi	-0.006854	0.0625525	-0.11	0.913	-0.12945	0.115747	
Dfdi*Domestic Credit	0.0007686	0.0018179	0.42	0.672	-0.00279	0.004332	
_Cons	4.78952	2.204896	2.17	0.03	0.468003	9.111037	
sigma_u	0						
sigma_e	2.794346						
rho	0	(fraction of variance due to u_i)					

Appendix 3 - Random Effects Model with Absorptive Capacity Variable for FDI with Interest Rate Spread

Random-effects GLS regression			Number of obs = 127				
Group variable: country			Number of groups = 8				
R-sq: within = 0.002			Obs per group		min=15		
R-sq: between = 0.8477					avg=15.9		
R-sq overall = 0.1488					max=16		
			Wald chi2(6) = 20.91				
corr(u_i,X) = 0 (assumed)			Prob > chi2 = 0.0039				
gdpgrowth	Coef.	Std Err	z	P>|z|	[95% Conf. Interval]		
Domestic Credit	-0.0144427	0.0183452	-0.79	0.431	-0.0504	0.021513	
Interest Spread	-0.0872051	0.0572427	-1.52	0.128	-0.1994	0.024988	
Population Growth	1.3345596	0.397803	3.35	0.001	0.554917	2.114276	
Dinternet	-0.0058027	0.0308411	-0.19	0.851	-0.06625	0.054645	
hdi	-2.532847	3.913609	-0.65	0.518	-10.2034	5.137685	
Dfdi	0.0286834	0.0578305	0.5	0.62	-0.08466	0.142029	
Dfdi*interest	-0.0019803	0.0067608	-0.29	0.77	-0.01523	0.011271	
_Cons	4.696458	2.236728	2.1	0.036	0.312551	9.080365	
sigma_u	0						
sigma_e	2.7908105						
rho	0	(fraction of variance due to u_i)					

Appendix 4 -Random Effects Model with Absorptive Capacity Variable for FDI with HD Index

Random-effects GLS regression				Number of obs = 127			
Group variable: country				Number of groups = 8			
R-sq: within = 0.0012				Obs per group		min=15	
R-sq: between = 0.8482						avg=15.9	
R-sq overall = 0.1492						max=16	
				Wald chi2(6) = 20.88			
corr(u_i,X) = 0 (assumed)				Prob > chi2 = 0.0040			
gdpgrowth	Coef.	Std Err		z	P>|z|	[95% Conf.	Interval]
Domestic Credit	-0.0142634	0.0183271		-0.78	0.436	-0.05018	0.021657
Interest Spread	-0.0968789	0.0557911		-1.74	0.082	-0.20623	0.01247
Population Growth	1.3961	0.4188642		3.33	0.001	0.575141	2.217059
Dinternet	-0.0040103	0.0308888		-0.13	0.897	-0.06455	0.056531
hdi	-2.751735	3.890643		-0.71	0.479	-10.3773	4.873786
Dfdi	-0.0419264	0.1498149		-0.28	0.78	-0.33556	0.251705
Dfdi*hdi	0.1119167	0.2857921		0.39	0.695	-0.44823	0.672059
_Cons	4.800886	2.204834		2.18	0.029	0.479491	9.122281
sigma_u	0						
sigma_e	2.7908105						
rho	0	(fraction of variance due to u_i)					