The Macroeconomic Impact of Foreign Direct Investment on Host Country: Case Study of SADC

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ABSTRACT

The effect of foreign direct investment (FDI) on gross domestic product (GDP), gross capital formation (GCF), exports and unemployment is examined in a panel of six Southern African Development Community (SADC) countries over a time period (1991-2015). Spatial patterns and/or unobserved common factors can be assumed to be shared among these countries due to the presence of cross-sectional dependence. A long run relationship between the variables is established through the co-integration test. Due to the homogeneous characteristic of the panel data diagnostic tests were conducted and the dynamic Driscoll-Kraay estimator, with fixed effects, was shown to be satisfactory to produce robust results given the violation of some assumptions in the panel like heteroscedasticty and cross-sectional dependence. The results align with the hypothesis that FDI does generally have a positive and significant effect on SADC.

Keywords: Macroeconomic variables, foreign direct investment, panel data, driscoll-kraay estimator

ÖZ

Bu çalışmada, doğrudan yabancı yatırımların (FDI), gayri safi yurtiçi hasıla (GDP), brüt sermaye oluşumu (GCF), ihracat ve işsizlik üzerine etkisini, Güney Afrika Kalkınma Topluluğu'na (SADC) üye altı ülke için 1991 - 2015 dönemi verileri kullanılarak incelenmiştir. Çalışmada, ülkeler arasında yatay kesit bağımlılığı olduğundan dolayı mekânsal özellikler ve/veya gözlemlenemeyen ortak özellikler olabileceği varsayılmaktadır. Değişkenler arasındaki uzun dönemli ilişki eşbütünleşme testi ile kurulmuştur. Panel verinin homojen karakterinden dolayı diagnostik testler yapılmıştır. Dinamik Driscoll-Kraay tahmincisi sabit etkileriyle birlikte panelin önemli varsayımları (değişen varyans ve yatay kesit bağımlılığı) ihlal edilmesine rağmen güçlü (tutarlı) sonuçlar ortaya koymuştur. Çalışma sonuçları, doğrudan yabancı yatırımların Güney Afrika Kalkınma Topluluğu üyesi altı ülkeyi genel olarak pozitif ve anlamlı olarak etkilediği hipotezini desteklemektedir.

Anahtar Kelimeler: Makroekonomik değişkenler, doğrudan yabancı yatırım, panel veri, Driscoll-Kraay Değerlendiricisi

TO MY FAMILY

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LIST OF ABBREVIATIONS

BOP	Balance of payments
CSD	Cross-sectional dependence
DCR	Democratic republic of Congo
DI	Domestic investment
DOMINV	Domestic investment
EXP	Exports of goods and services
FDI	Foreign direct investment
FE	Fixed effects
GCF	Gross capital formation
GDP	Gross domestic product
GNI	Gross national income
H0	Null hypothesis
H1	Alternative hypothesis
MAX	Maximum
MFR	Mixed fixed and random
MIN	Minimum
MOZ	Mozambique
OBS	Observations
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary least squares
RE	Random effects
SA	South Africa

SADC	Southern African Development Community
SWZ	Swaziland
TZA	Tanzania
UNEMP	Unemployment
VAR	Vector auto regression
ZIM	Zimbabwe

Chapter 1

INTRODUCTION

This introductory chapter intends to give a brief background of the study followed by the statement of intent and the aim of the study. Further into the chapter the research questions we will aim to answer will be provided followed by an overview of the succeeding chapters for the reader's consumption.

1.1 Background of the study

Being part of the global village each country's growth and development is now affected by external and not only by internal influences. Globalization can be described as the process in which countries become increasingly integrated through communication, finance, economics, transportation and trade. This kind of integration through trade and investment in the form of imports and exports, portfolio investment or foreign direct investment (FDI) is essential for developing countries.

The importance of FDI inflows for developing countries is unquestionable even though most studies show that general flows have been concentrated more in developed countries. This importance can be attributed to the fact that in many economies FDI is one of the many reasons amongst others given to explain the increased interdependence of national economies, and therefore the much needed economic development in these developing countries.

Since FDI is believed to be a great tool for economic development, and as member states of the Southern African Development Community (SADC) works towards achieving their long term economic goals they are not excluded from those countries that depend on foreign investment to achieve those goals.

According to XU et. al. (2010), SADC countries are typically characterized as poor on average. However, even though the amount of FDI inflows into SADC in comparison to other regions and other developed countries is quite less, it has undoubtedly facilitated in the economic transformation of these SADC countries.

The definition of FDI differs from one country to another. The denotation of FDI explains it to be money that is invested in companies, property, or other assets by people or organizations from other countries.

FDI however can further be explained as an investment where the investor who is based in the home country governs the ownership in the business invested in, in the host country and this investor can either be an entity or business. Thus to give more meaning to the definition above, FDI is an acquisition of foreign assets with the intention to exert control directly or indirectly by owning 10 percent or more of the voting securities of the company.

The key characteristic of a FDI that we should look out for is that this kind of investment gives the investor operative control or at least a considerable amount of influence with the decision making of the foreign business.

FDIs can be carried out in various ways like establishing a new business operation in a foreign country, by means of merger or joint venture with a foreign company, opening of a subordinate company, purchasing business assets in the host country, or obtaining a supervisory interest in an existing foreign company.

Often made in open economies, these FDIs include the provision of management and/or technology not only a capital investment as stated by the simple dictionary definition.

There are different categories under which to categorize FDIs such as horizontal, vertical or conglomerate. Turkcell which is a cell phone provider established in Turkey opening up stores in the United States would be an example of a horizontal direct investment since the investor would be opening a similar type of trade in a foreign country, which was initially in his home country. A vertical investment is characterized by having different business activities established in a foreign country which are however linked to the investor's main business in the home country. Lastly, when an investment is made towards a business activity that is separate from the investors existing business in the home country, we categorize this investment as a conglomerate type of FDI. This type of investment is similar to a joint venture as it involves entering a trade that the investor has no past experience in with a foreign company that is already operating in that trade.

1.2 Statement of intent

In 2012 SADC conveyed that as it attempts to develop their economies as a long term objective many of the individual states within SADC rely on investments from other nations. For this purpose to encourage such FDI, SADC has come up with

policies and procedures allocating funding into production, instead of collecting it solely through the sale of stocks and bonds. Creation of jobs in the region and the development of SADC's infrastructure and industry which is necessary for the growth of the economy are thought to be one of the things FDI contributes to. Through these cooperative activities, the superior goal of accelerated Regional Integration in SADC also benefits.

The 2008 global economic recession undoubtedly affected FDI in SADC causing total FDI between the years 2009 and 2010 to fall by almost 50%. We have to keep in mind however that the member states are not all the identical in terms of infrastructure, market size, quality, political stability or natural resources availability which are all the aspects that influence international investment. As a result, some SADC member states have managed to attract more FDI as compared to others as the years went by. Example of such member states are South Africa and Angola, who have factually had higher levels of FDI. The Democratic Republic of Congo which is considered as one of the low economy countries and was lagging behind in terms of its FDI realized a significant increase in its net FDI inflow in 2010.

With that said, since previous studies have shown that FDI gives evident benefits to host countries, this study aims to study the effect of FDI on GDP, GCF, UNEMP and EXP , which are some of the macroeconomic variables said to be the drivers of the much sought after economic development, in six SADC countries.

1.3 Aim and economic approach of the study

The study aims to analyze the impact of FDI inflows on the macroeconomic variables such as GDP, GCF, EXP and UNEMP individually in the SADC countries for the period 1991-2015. The countries under study are:

Three lower middle income economies (Mozambique, Tanzania and Zimbabwe); one upper middle income economy (Swaziland); one upper middle economy (South Africa) and one low income economy (Democratic republic of Congo) all under the SADC.

According to the World Bank data team (2016), Low-income economies are characterized by a GNI per capita $1,025 or less. Lower-middle-income economies are characterized by a GNI per capita between $1,026 and $4,035. Upper-middle-income economies are characterized by a GNI per capita between $4,036 and $12,475 and high-income economies are those considered to have a GNI per capita that is $12,476 or above. These GNI per capita figures were all as of the year 2015.

Since we will be gathering results across different countries over a period of 25 years, this will require us to employ panel data techniques and estimations.

1.4 Research questions

The thesis intends to answer the following questions which will be supported by the relevant economic theory and empirical findings in the following chapters of the research paper:

What is the effect of FDI on the macroeconomic variables mentioned above in SADC countries (i.e. how much is this effect) and if it is significant or not and how our paper modifies or adds to existing literature of similar interest.

1.5 Outline

The following chapters are arranged as follows:

Chapter two provides the reader with the literature review related to this study. A brief introduction will be given, followed by the conceptual framework which is very important since it enlightens us on some of the different schools of thought that are the basis for some of the first studies done on FDI. Theoretical literature will follow covering the general discussion of FDI, global FDI, FDI in Africa and conclusively FDI in SADC.

In chapter three, a brief summary of the economy of the 6 sample countries will be given, followed by the definition and actual figures of the different variables under study. Furthermore the methodology and the formal econometric models will be specified. Finally the null and alternative hypotheses will be defined.

Chapter four provides firstly, the descriptive statistics alongside the cross-sectional dependence results followed by the correlation analysis that helped inspect possible multicollinearity, which is then followed by the unit roots tests.

Chapter five provides the co-integration test, specification tests and empirical results that are obtained from regression analysis. Furthermore, the interpretation of results obtained concerning the impact of FDI on GDP, GCF, UNEMP and EXP are explained in detail.

The final chapter is dedicated to the summary and closing remarks. In this chapter, quoted reference of the existing empirical studies and results obtained from this

research are compared. The questions to the research questions provided earlier are hopefully answered by the end of this chapter.

Chapter 2

LITERATURE REVIEW

The individuality of this thesis is that it intends to makes a minor contribution to an already small frame of research covering FDI, economic development and macroeconomics in SADC economies. This chapter with the aid of past studies aims to give a review of literature on FDI from a global as well as African perspective focusing mostly on developing economies. Many studies have documented the contribution of FDI to host economies (Guris, 2012; Nazlioglu et al., 2009; Kalim et al., 20102; Taspinar, 2014; Kurtovic et al., 2014; Guris et al., 2015; Yilmaz & Can, 2016).

2.1 Conceptual framework

It might be important to study the foundation schools of thought that make for better understanding of FDI, its determinants, its direction (inward or outward), but most importantly for this study - its consequences. There are a number of different schools of thought that explain the reasons for, or the direction of FDI etc.

According to Elhassan (1992), Liberals, structuralists, Marxists, dependencia, trade theories, and location theories attempt to determine how the decision of - from which countries and into which countries FDI flows is made. Industrial organization theory attempts to determine from which industries FDI emerges. Structuralists, Marxists, dependencia, and industrial organization explain which firms undertake FDI, whereas the reason why firms undertake FDI is explained by all the already

mentioned theories. Lastly, structuralists, Marxists, and political risk analysis give light as to which conditions assist or disrupt the flow of FDI.

These theories serve as a foundation for some of the first studies done on FDI which have also given birth to some of the most recent studies as well.

2.2 Theoretical literature on FDI

Empirical literature on the influence of FDI on macroeconomic variables is inadequate especially for the SADC countries. However, infinite literature has been done worldwide for different countries all differing in characteristics and table 2.1 provides a summary of the empirical literature. The studies mentioned in the table are from different countries, conducted during different time periods, some have employed different techniques, but the variables used in their respective empirical models are similar to those we will also use in this study.

Early studies on FDI, such as Singer (1952) and Prebisch (1968) claimed that the host countries of FDI hardly benefit from these inflows, because most benefits are transferred to the multinational company's country (Sumon, 2014, p.340).

The general study of theoretical and empirical literature on FDI however showed that FDI has different effects on economies both in developed and developing countries. Thus the influence of FDI on the different macroeconomic variables is expected to also sometimes not be straightforward and varies across host countries.

Carkovic and Levine (2005) applied different econometric techniques that made them come to the conclusion that after taking in to consideration factors such as trade

openness FDI still does not put forth an independent and robust effect on growth. They also found that countries with higher education are not affected by FDI.

Counter arguing the views of Carkovic and Levine, Blonigen and Wang (2004) argued that they had found different scenarios where the incorrect pooling of data when doing studies on either developed or developing countries was the reason for incorrect conclusions or some empirical results that concluded that FDI does not have a significant effect on economic growth.

Dating forward however, the consensus based on the references from more recent studies seems to be that there is a positive link between FDI inflows and economic growth and development, given that a minimum level of educational, technological and infrastructure development have been acquired in host countries (Hansen & Rand, 2006).

2.3 FDI – Global FDI & FDI in Africa (developing countries)

Global FDI inflows have been fluctuating between developed and developing countries and developed countries have usually received a large share of FDI inflows since the 1980s although this has steadily dropped over time.

Borensztein, Gregorio and Lee (1998) used seemingly unrelated regression technique (SUR) to estimate the effect of FDI on economic growth with the use of data on FDI from 69 developing industrial countries from 1970-1981. The variables that were under study were GDP growth, human capital, initial GDP per capita and domestic investment. The authors found that FDI is an essential tool for the transfer of technology, and for the contribution towards growth which is relatively more than

the contribution of domestic investment. However, the host country must have a minimum threshold stock of human capital in order for the theory of higher productivity of FDI to hold. Thus, economic growth is considered an attribute of FDI when a sufficient absorptive skill of the advanced technologies is accessible in the host economy (Vilks et al., 2017).

Global FDI is reported yearly by the United Nation Conference of Trade and Development (UNCTAD) and below are some graphical results from previous years and expected projections for 2017-2018.

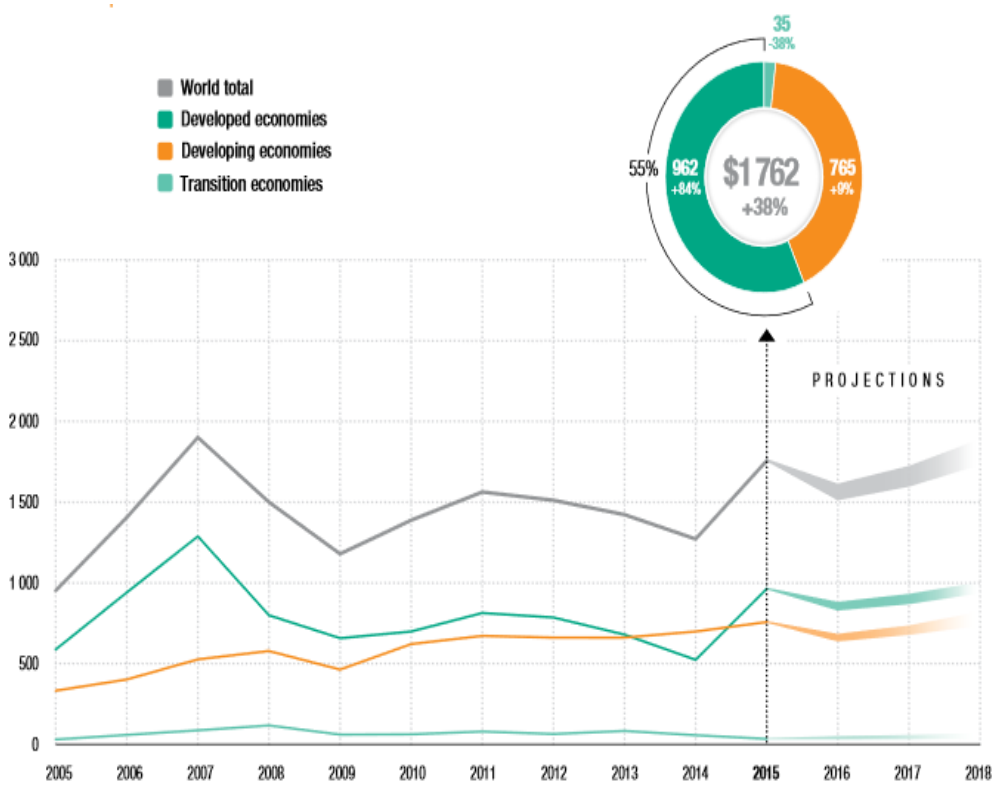

Figure 2.1: Global FDI inflows of group economies 2005-2015 and projections 2016-2018 (billions of dollars & percent), (UNCTAD, FDI/MNE database www.unctad.org/fdistatistics)

Other FDI studies conducted in Africa show that FDI inflow has been dominated by the OECD countries which have accounted for 83% of FDI inflows from years 2005-2010.

South Africa, Egypt and Nigeria during the period 2007-2009 were the three countries in Africa in which 60% of investments were concentrated. The key investors have been OECD companies in the extractive industries from United Kingdom, France and the United States (WIR, 2011).

One of the studies on the effects of FDI done in Africa by Seetanah and Khadaroo (2001) investigate empirical evidence of FDI effect on economic growth from Sub-Saharan African countries from the period of 1980 to 2000. A panel data set of thirty-nine sub-Saharan countries was used and employed both static and dynamic panel data estimates in analyzing the data. The study suggested that FDI is an essential component of economic growth in Sub-Saharan countries. Furthermore, the study proved that the existence of significant endogeneity relationship in FDI-economic growth is not only observed to enhance economic growth but to chase economic growth as well.

Another empirical investigation was a panel analysis done by Lumbila (2005) between the years 1980-2000 on 47 African countries on the effects of FDI. Generally, the analysis indicates that FDI applies a positive impact on the parameters that determine growth in Africa. Also, elements such as a stable macro setting in the host countries, trained labor alongside an attractive investment environment brought about by advanced infrastructure, lower country risk all enrich the impact of FDI on growth (Lumbila, 2005).

2.4 FDI in SADC

Mahembe (2014) states that, FDI inflows in SADC have increased by nearly fifty times since the first investment was made in SADC three decades ago from a measly US$372 million in 1980 to US$17 billion in 2008. Although they decreased to US$7 billion in 2010 FDI inflows to SADC show signs of recovery as 2011 recorded US$10 billion in investment inflows which is estimated to be a 38% increase. Growing by 24times, total FDI inflows into SADC middle-income countries have also grown from US$242 million in 1980 to US$6 billion in 2011.

A paper by XU et al. (2010) gave evidence that suggested that development in the SADC region has significantly been facilitated by FDI and that foreign ownership on local economies were found to have positive effects in the region (Fan et al., 2009).

Table 2.1: Summary of Empirical Literature of FDI on different Macroeconomic variables

AUTHORS	YEARS	COUNTRIES	EMPIRICAL APPROACH	VARIABLES	FDI EFFECT ON VARIABES
Borensztein et. al. (1998)	1970-1989	69 developing countries	Seemingly Unrelated Regression Technique (SUR)	GDP, GDP per Capita, Human capital, DI	positive effect when there is minimum threshold of capital stock available
Balasubrama-nyam et. al. (1996,1999)	1970-1985	46 developing countries	OLS regression	GDP, Human capital real wages	positive if country is more open to trade
Nair-Reichert and weinhold (2001)	1971-1975	24 developing countries	MFR panel data estimation	GDP	significant and positive
Kumar and Pradhan (2002)	1970-2003	11 African countries	VAR	GDP growth, domestic investment rate, growth rate of labor force, growth rate, human capital stock	positive but not significant
Johnson (2006)	1980-2002	90 countries	cross-section, panel data & time series regressions	DOMINV, Growth(GDP)	positive effect on developing countries and no impact on developed countries
Seetanah and Khadaroo (2001)	1980-2000	39 sub saharan africa countries	pooled mean group technique	output, K,L,A,G	negative and statistically insignificant in low income & middle income countries
Bitzer et al (2008)	1989-2003	17 OECD countries	panel data regression techniques	Industry purchases	FDI has positive impact on productivity
Roy et al (2012)	1981-2008	9 Asian Countries	Granger causality	GDP	causality exists but not for all countries

Chapter 3

DATA AND METHODOLOGY

3.1 Economy of sample countries

In order to set appropriate long term development goals in any economy it is important to be well aware of the current economic position in that economy first.

The table below provides the absolute figures of some economic indicators of the six countries under study for years as recent as 2015, 2016 and 2017. The first few indicators that were selected are the basic macroeconomic indicators we look at when we study a country's economy and the rest of the indicators such as tertiary school enrollment, innovation index (which includes two sub-indices providing information also on human capital, infrastructure, knowledge & technology outputs etc.) were chosen to coincide with Hansen and Rand's notion that we mentioned earlier that there exists a positive link between FDI inflows, economic growth and development given that a minimum level of educational, technological and infrastructure development have been attained in host countries (Hansen & Rand, 2006).

Table 3.1: Summary of macroeconomic indicators

Country	GDP (USD bil)	GDP/capita (USD)	UNEMP (%)	Tertiary school enrollment (%)	Investment freedom index (0-100)	Overall globalization index (0-100)	Innovation index (0-100)
SA	294.8	7504	27.7	19.66	45	65.23	35.8
SWZ	3.727	3911	25.28	5.33	50	48.7	25.4
TZA	47.43	867	2.62	3.65	60	38.39	26.4
DRC	35.2	456	3.64	6.64	20	42.05	-
ZIM	16.29	909	5.09	-	10	50.54	22.5
MOZ	11.01	515	24.37	5.97	35	46.43	29.8

Source: Author's compilation
Note: hyphen (-) indicates that no data was found
Tertiary school enrollment as a % of eligible children

Given these criteria by Hansen and Rand (2006), just from looking at the data we can assume that South Africa should have the most number of FDI inflows among these 6 countries, which is true because according to past research, South Africa generally has had the highest FDI inflows in the SADC.

3.2 Defining the variables

3.2.1 FDI

The World development report (2016) describes FDI as the ability to acquire a permanent managing interest (of no less than 10 percent of voting stock) in a company operating in an economy that is different from that of the investor. It is the summation of equity capital, reinvested remunerations, other short term and long-term capital.

The series that were chosen depict net inflows (new investment inflows less disinvestment; BOP, current $) in the six countries of interest from foreign investors and the following graph helps get a visual idea of how the flows are in each country for the years 1991-2015 and it is taken as a percentage of GDP to get a clearer image of the of this trend.

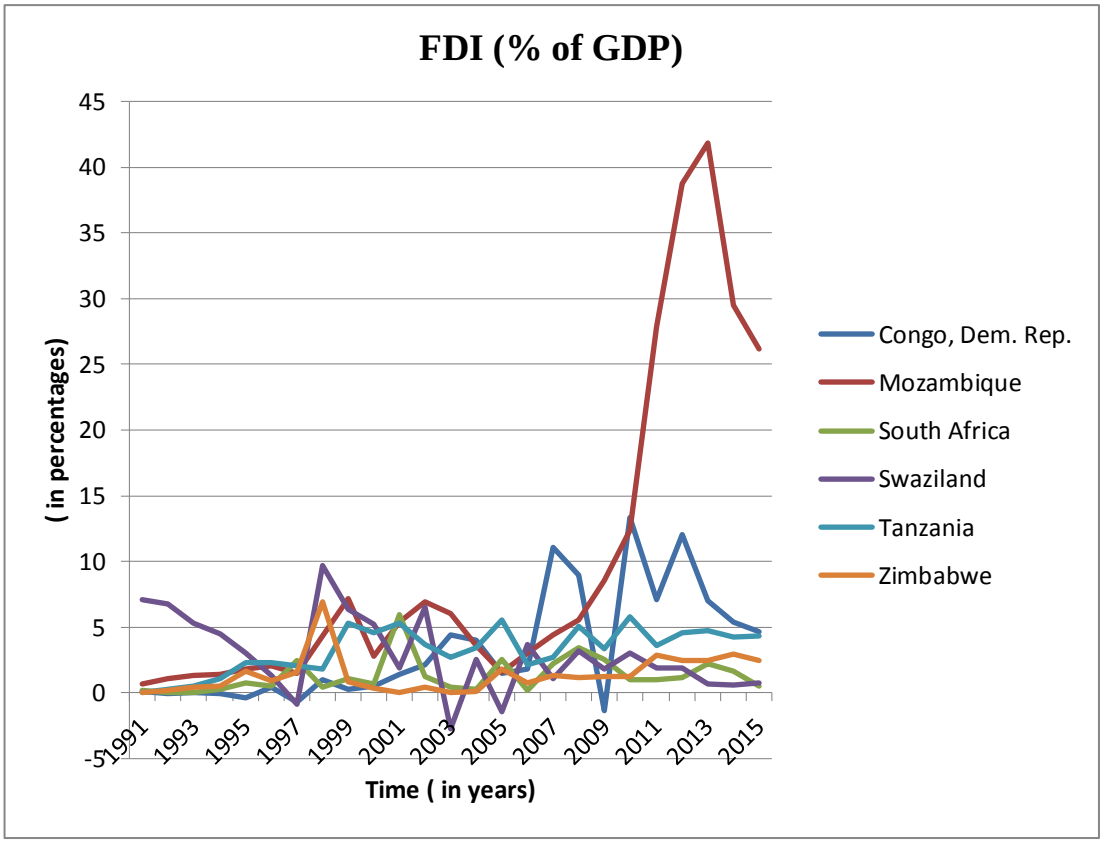

Figure 3.1: Sample countries' FDI line graph (1991-2015)

3.2.2 Gross domestic product

Known as the market value of all final goods and services produced in a country within a given time period (usually a year), GDP is the most common measure of how well an economy is doing. If GDP growth is strong, firms is able to employ more workers and also manage to pay higher salaries and wages which leads to households consuming more goods and services.

The United States which is the largest economy of the world had a GDP of close to $19 billion as of the end of the 2016 financial year.

The following graph depicts the GDP figures of the six countries under study during the period 1991-2015, and it is in current US dollars.

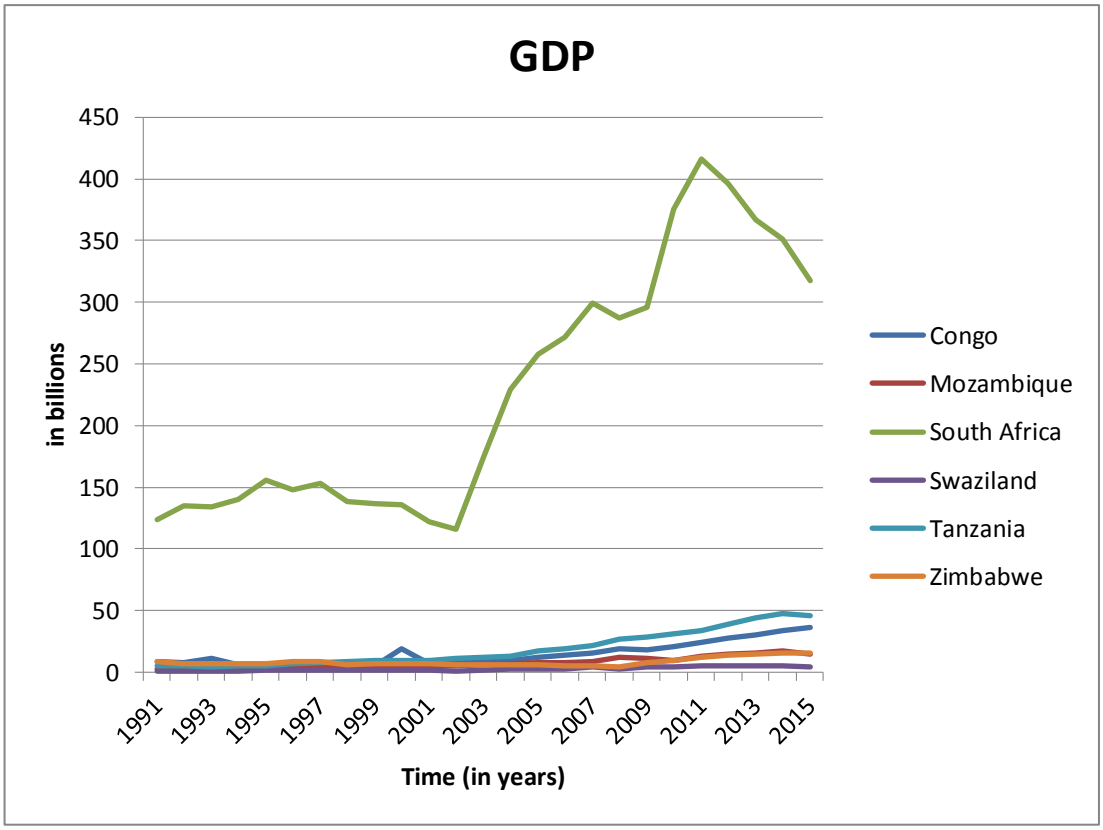

Figure 3.2: Sample countries' GDP line graph (1991-2015)

3.2.3 Gross capital formation

Scott (2003) defines Gross capital formation as the creation of useful assets that increase an economy's ability to produce goods and services. Private savings allow resources to be channeled towards corporate investment rather than individual household consumption which then facilitate capital formation. Gross capital formation is measured by the aggregate estimation of the gross fixed capital formation, variations in inventories and acquisitions less transfers of assets for a unit or division.

It is very important macroeconomic parameter which guides the growth of an economy and in the study it has been used as a proxy for domestic investment.

The following graph demonstrates the GCF trend between the years 1991-2015 and it is taken as a percentage of GDP to get a clearer image of this trend.

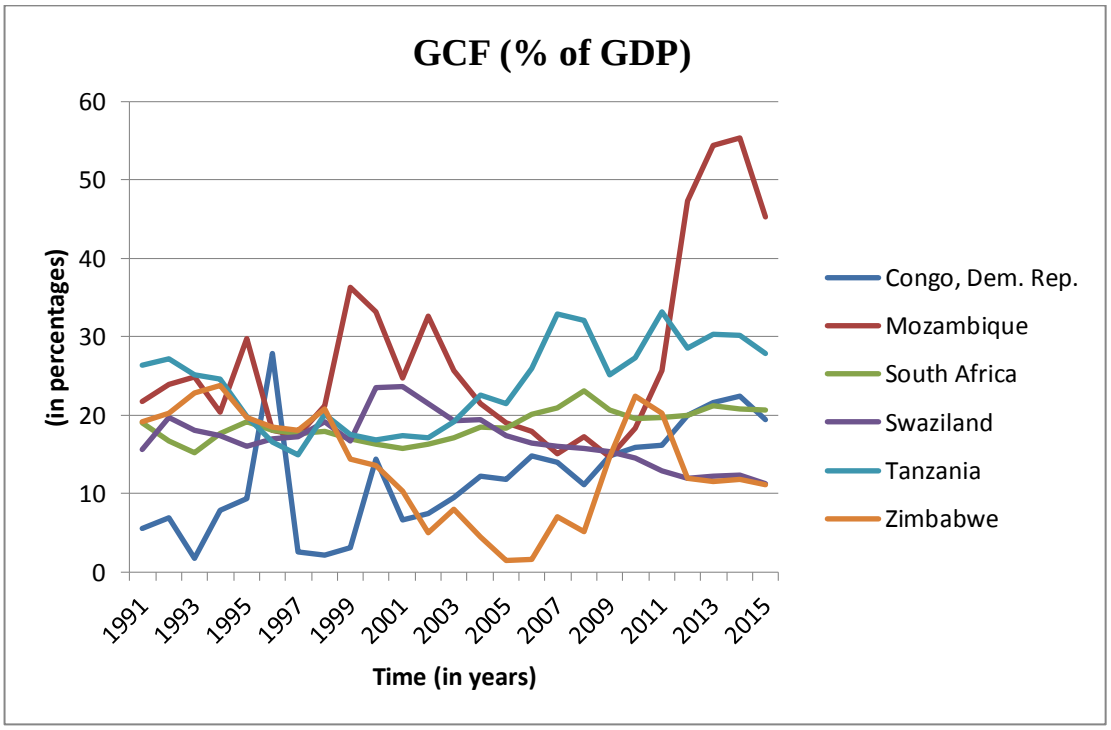

Figure 3.3: Sample countries' GCF line graph (1991-2015)

3.2.4 Unemployment rate

There is one social indicator of development that we look at in this study and it is unemployment rate, which can be defined as or represents the share of the labor force that is not working in the economy but is available for and actively seeking for employment.

The rise in paid and secure employment has continuously been categorized as one of the most chief policy objectives for developing countries as many countries aim for an equitable sharing of income and greater standard of welfare for most of the people.

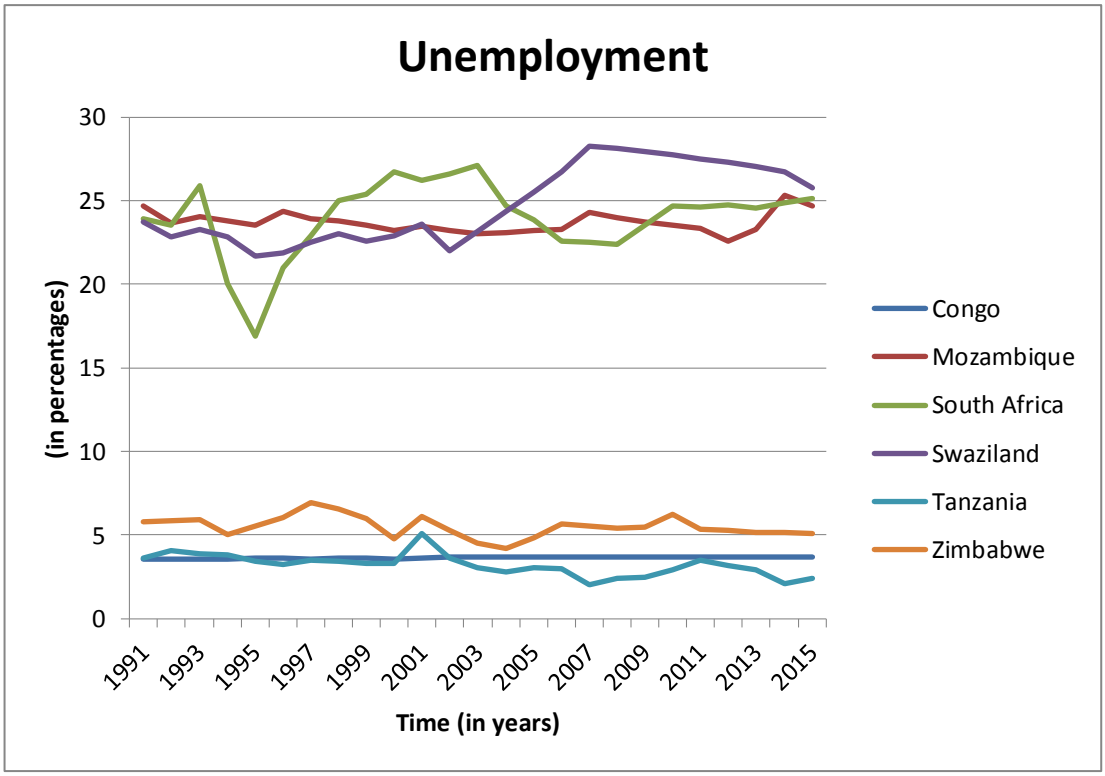

Figure 3.4: Sample countries' UNEMP rate line graph (1991-2015)

3.2.5 Exports

Exports of goods and services suggest the value of all goods and other market services supplied to the rest of the world. They incorporate the value of transport, license fees, royalties produce, cargo, insurance, travel, and other services, such as information, communication, construction, business, financial, personal, and government services. They exclude the remuneration of workers and investment earnings and transfer payments (Africa development indicators 2011, 2011).

The following graph demonstrates the trend in EXP between the years 1991-2015 and it is taken as a percentage of exports to get a clearer image of this trend.

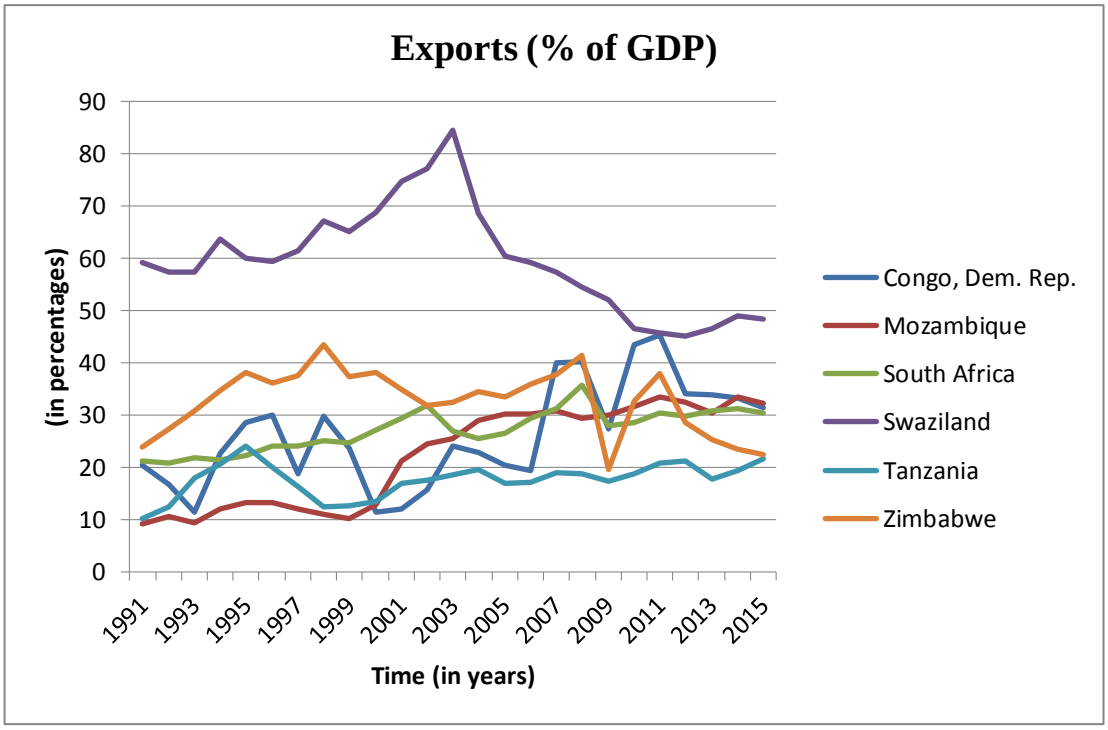

Figure 3.5: Sample countries' EXPORTS line graph (1991-2015)

3.2.6 Link between FDI, GDP, GCF, EXPORTS and UNEMP

The assumed links between FDI and these variables (GCF, EXP, UNEMP & GDP) generally are that for example FDI can attempt to eliminate unemployment in the host countries firstly by foreign companies' employing people in their domestic operations or even with the growth of FDI in related trades, employment is likewise created in various sectors of the economy.

FDI regularly assumes an extraordinary role in employment creation and advancement of the host countries due to the unique features of foreign investments i.e. its inclination to be greater in size, with more technological sophistication, and ability to face more competitive forces in their product markets as compared to local businesses (Sun, 2002).

The potential benefits of FDI on DI are that FDI *enriches* or maximize some of the benefits already generated by domestic investments in a developing or host economy.

For exports, the export volume in a host country is expected to be influenced positively by FDI. This is fairly in tune with notion that technology intensity influences export performance and therefore an industry accompanied with high technology efforts is inclined to export more, and as we have learnt FDI comes with the provision of this technology. A country which imports foreign technology can be assumed to have better export performance; this is why it is assumed that these countries have had FDI inflows to facilitate this high export performance.

The explanation of the links of FDI with these parameters are endless but later in the study we will examine if the trends exhibited graphically were indeed somewhat influenced by the incoming FDI flows in the six countries of study. This will give us a clearer indication if the links exist or not.

3.3 Methodology

There are different types of data that are generally available for empirical analysis but in this study we use panel data to estimate our model. "Panel or longitudinal data sets consist of a time series and cross-sectional dimension and the distinguishing feature of this type of data is that the same cross-sectional units are followed over a given time period" (Wooldridge, 2015, p. 9).

Some advantages of this kind of data are that it can be used to account for time-invariant unobservables and model lagged responses.

The grouping of time series with cross-sections can enrich the quality and amount of data in ways that would be unmanageable if we were to use only one of these two dimensions (Gujarati et al., 2003).

There are numerous types of panel data analytic models. The traditional or classical panel models in particular: constant coefficients models (i.e. pooled OLS), fixed effects models, and random effects models.

The Fixed Effects (FE) Model would have constant slopes but intercepts that vary according to the cross-sectional unit—for example, the country, whereas the Random Effects (RE) Model demonstrates a regression with a random constant term (Greene, 2003).

In this study we will only attempt to compute the FE and RE models and with the help of the test by Hausman (1978), determine which test is better for the study. This test compares the difference between the FE and RE estimators of the coefficient vectors, where the RE estimator is efficient and consistent under the null and inconsistent under the alternative hypothesis. The fixed effects estimator is consistent under both the null and the alternative hypothesis. In the event that the null is true then the difference between the estimators should be almost zero.

In order to formalize the relationship or effect of FDI on GDP, GCF, EXP and UNEMP firstly panel data was collected from World Development Indicator for the period of 1991-2015. In this current study, GCF was used as a proxy for Domestic Investment (DI). The econometric model formulation is given below.

3.4 The models

The GDP, GCF, Exports of goods and services and unemployment rate is estimated respectively in which the six countries are represented as panels and the number of years at time (i=1…6 and t=1991…2015). Two models will be adopted, fixed effect and random effect.

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2\ GCF_{it} + \beta_3 EXP_{it} + \beta_4 UNEMP_{it} + u_{it} \ldots\ldots\ldots\ldots\ldots (1)$$

$$GCF_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDP_{it} + \beta_3 EXP_{it} + \beta_4 UNEMP_{it} + u_{it} \ldots\ldots\ldots\ldots\ldots (2)$$

$$EXP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDP_{it} + \beta_3 GCF_{it} + \beta_4 UNEMP_{it} + u_{it} \ldots\ldots\ldots\ldots\ldots (3)$$

$$UNEMP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDP_{it} + \beta_3 GCF_{it} + \beta_4 EXP_{it} + u_{it} \ldots\ldots\ldots\ldots\ldots (4)$$

Our baseline model is fixed effects for GDP, GCF & EXP and Random effects for UNEMP. This is based on the Hausman test (see table 5.2.1) but we still conduct the Driscroll-Kraay regression estimation for robustness.

3.5 Hypotheses of the study

H_0: FDI inflows do not affect GDP, GCF, UNEMP & EXP

H_1: FDI inflows affect at least one of these variables

Chapter 4

ECONOMETRIC PROCEDURES

4.1 Descriptive statistics and cross-sectional dependency

The descriptive statistics below are used to summarize and describe the data collected for the study which was obtained through the World Bank website. They provide the mean, median, standard deviation, minimum and maximum values respectively.

Baltagi (2008), when examining macro panels with long time series, it is a common outcome to detect the existence of cross-sectional dependence (CSD) and if detected, it leads to the existence of common unobserved factors that sway the development of countries' variables over time. Cross-sectional dependency indicates interdependence or association among the cross-sections that is a consequence of countries sharing common shocks, so this implies that irrespective of the geographical distance between countries, if they react in a similar fashion to the same events, then this causes correlation between them. Cross-sectional independence however suggests that countries react independently. The null and alternative hypotheses are as follows:

H_0: No cross-sectional dependency

H_1: Cross-sectional dependency

The analysis of the CSD, the descriptive statistics, and the order of integration or stationarity of the variables should be fulfilled in order to capture the features of both time series and cross-sections (Fuinhas, Marques & Couto, 2015).

Table 4.1: Descriptive statistics and CSD results

Descriptive statistics						**Cross-sectional Dependence**			
Variable	Obs.	Mean	Std. Dev.	Min.	Max	CD-test	P-value	Corr.	Abs (Corr.)
FDI	142	22.012	.099	9.210	23.014	7.95	0.000	0.410	0.443
GDP	142	23.317	.505	20.868	20.868	16.57	0.000	0.856	0.856
GCF	142	21.534	.693	18.264	25.132	12.12	0.000	0.626	0.630
EXP	142	25.131	.502	19.231	25.566	15.42	0.000	0.796	0.796
UNEMP	142	.297	.924	0.693	3.3407	-1.53	0.126	-0.079	0.282

Notes: Under the null hypothesis of cross-section independence CD ~ N(0,1). Variables were transformed into their log form for descriptive statistics in eviews.

Table 4.1 above provides information on the descriptive statistics of the variables together with their cross-sectional dependence which is estimated by the CSD test on stata.

The descriptive statistics point out that the exports have a higher average than the other series, while unemployment has the lowest average. With the above results, we can also conclude with the aid of the CD test by rejecting the null at the 5% significance level, that countries do share similar developments for all variables except for the rate of unemployment (i.e. cross-sectional dependency exists) and this feature could lead to biased estimation results.

4.2 Correlation matrix

According to Idowu and Leal Filho (2009), in order to inspect the correlation between the independent variables as well as to have some approximate idea relating to the multicollinearity problem the correlation matrix has to be computed.

The null hypothesis for this test is that there is no correlation between the variables under study and the alternative hypothesis is that there is correlation between the variables. The rejection criterion is that if the probability value or significance value is less than 5% (0.05) then we can reject the null hypothesis. The correlation value shows us if the relationship between two variables is strong, weak or moderate, thus we can define the strength of the correlation in words using the guide Evans (1996) suggests for the absolute value of **r**:

Table 4.2: Correlation range and description of the strength of the correlation

Correlation range	**Strength of Correlation**
.00 - .19	"Very weak"
.20 - .39	"Weak"
.40 - .59	"Moderate"
.60 - .79	"Strong"
.80 – 1.0	"Very strong"

The t-stat. on the other hand must always be greater than 2, indicating a significant association between variables. The probability value should also be less than 5% to show a significant relationship between variables.

Thus given the Pearson correlation results in table 4.2.2, they show us that most variables have a strong – very strong relationship with each other apart from unemployment which has a weak relationship with the other variables as its t-statistic range is from 0.23-0.35. The probability values for all variables are less than 5% indicating that there is no correlation among all the variable, therefore the multicollinearity problem does not exist.

Table 4.3: Pearson Correlation Coefficient results

Correlation T-statistic Probability	FDI	EXPORTS	GCF	GDP	UNEMP
FDI	1.000000 ----- -----				
EXPORTS	0.681368 11.32495* 0.0000**	1.000000 ----- -----			
GCF	0.694244 11.73458* 0.0000**	0.992550 99.10569* 0.0000**	1.000000 ----- -----		
GDP	0.653336 10.49863* 0.0000**	0.992466 98.54334* 0.0000**	0.993651 107.4448* 0.0000**	1.000000 ----- -----	
UNEMP	0.233396 2.920027* 0.0040**	0.347011 4.501279* 0.0000**	0.334151 4.313041* 0.0000**	0.346000 4.486374* 0.0000**	1.000000 ----- -----

*Notes: *t-statistic **probability value*

4.3 Unit root

As stated in the beginning of this chapter, the analysis of the order of integration must be done to capture the features of both series and cross-sections (countries).

Until very recently, panel data studies have ignored the crucial stationarity and cointegration tests. However, with the growing involvement of macroeconomic applications in the panel data tradition, the issues of stationarity and cointegration have also emerged in panel data (Asteriou & Hall, 2011). According to Apinran (2017) unit root test are necessary in the face of the problems related with spurious regression to guarantee stationarity of the parameters and order of integration.

The stationarity of a data set, which is when the statistical properties such as autocorrelation, mean, variance, and covariance are all constant over time, is important because it has the ability to influence the behavior and properties of the series. For example if there are persistent shocks within SADC and the series is not stationary it will lead to spurious regression results more especially if you are estimating a static panel model like my own (i.e. no lagged dependent variable). According to Gujarati (2015), the implication of a spurious regression is a data set with no explanatory power and policy strength, showing significant *F* and *t* statistics with a very high R-squared but no real relationship between variables because they are each growing over time.

The general null and alternative hypotheses for unit root tests are as follows:

H_0: Panels are not stationary (panel contains unit root)

H_1: Panels are stationary (no unit root)

It is by now a commonly accepted argument that the frequently used Dickey-Fuller (DF), augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests lack distinguishing power in determining the unit root null from the stationary alternatives (Maddala & Wu, 1999).

Thus the Levin-Lin-Chu (2002) tests which incorporate a time trend and individual & time specific effects along with Im-Pesaran-Shin (IPS) test (2003) and the Fischer test to name a few are the more appropriate tests for panel data as they increase the power of test results as compared to the time series ADF tests. From these results we will also know the order of integration for the series we are investigating.

Table 4.4: Unit root Test - Levin, Lin & Chu results

Unit root Test - Levin, Lin & Chu

Variables	LLC (level)				LLC(1st difference)					
	Intercept		Trend & Intercept		Intercept		Trend & Intercept		None	
	Statistic	Prob. Value	Statistic	Prob. Value	Statistic	Prob. Value	Statistic	Prob. Value	Statistic	Prob. Value
FDI	2.2473	0.9877	-1.6351	0.0510	-14.8635	0.000	-6.8734	0.000	-16.6701	0.000
GDP	2.6568	0.9961	-0.7109	0.2386	-5.4030	0.000	-5.5342	0.000	-7.4973	0.000
GCF	0.3469	0.6357	-0.9940	0.1601	-4.7152	0.000	-0.9292	0.176	-8.1784	0.000
EXP	1.2813	0.9000	-0.3255	0.3724	-4.7682	0.000	-5.2386	0.000	-4.3483	0.000
UNEMP	-1.4967	0.0672	-1.3363	0.0907	-10.1886	0.000	-8.7001	0.000	-11.4514	0.000

Table 4.5: Unit root Test - PP -Fischer chi-square results

Unit root Test - PP -Fischer chi-square

Variables	IPS(level)				IPS (1st difference)					
	Intercept		Trend & Intercept		Intercept		Trend & Intercept		None	
	Statistic	Prob. Value	Statistic	Prob. Value	Statistic	Prob. Value	tatistic	Prob. Value	Statistic	Prob. Value
FDI	29.53	0.0033	40.18	0.0001	223.24	0.000	823.05	0.000	173.42	0.000
GDP	1.03	1.0000	6.35	0.8975	56.378	0.000	280.09	0.000	76.93	0.000
GCF	3.82	0.9865	3.76	0.9874	59.98	0.000	91.81	0.000	86.64	0.000
EXP	2.44	0.9984	6.12	0.9101	82.44	0.000	98.81	0.000	94.39	0.000
UNEMP	20.50	0.0583	16.09	0.1872	100.81	0.000	89.18	0.000	133.41	0.000

Table 4.6: Unit root Test - Im-Pesaran-Shin results

Unit root Test - Im-Pesaran-Shin

Variables	IPS(level)				IPS (1st difference)			
	Intercept		Trend & Intercept		Intercept		Trend & Intercept	
	Statistic	Prob. Value	Statistic	Prob. Value	Statistic	Prob. Value	Statistic	Prob. Value
FDI	.2777	0.8993	-3.0252	0.0012	-14.8635	0.000	-11.2689	0.000
GDP	.7422	1.0000	0.4821	0.6851	-5.2631	0.000	-5.5330	0.000
GCF	.9129	0.9721	0.4788	0.6840	-5.8026	0.000	-4.7679	0.000
EXP	.6858	0.9964	0.5637	0.7135	-4.7682	0.000	-5.5483	0.000
UNEMP	1.5743	0.0577	-0.7712	0.2203	-9.2171	0.000	-7.4830	0.000

From the results above it is evident that the variables are stationary at first order difference because we can only reject the null if the probability values are less than 0.05. If the variables were stationary at levels this would mean that they have a natural long-run relationship, but since they are stationary at first difference we need to conduct co-integration tests to explore for long-run equilibrium relationship or a long-run equilibrium bond with the series. The co-integration results will be reported in the following chapter.

Chapter 5

EMPIRICAL RESULTS

Since we detected cross-sectional dependency we need to use techniques that account for this shortfall, along with the dynamics of short and long runs. If we do not do this or control for cross-sectional dependence it could arouse both inaccurate estimates and severe identification difficulties. Under the unit root results we could not conclude that the variables have a natural long-run relationship which occurs if variables are stationary at level. Thus to explore for long run equilibrium relationship, the Johnsen (1988) co-integration tests have conditions that should be met before we can establish this long run relationship such as: variables should not be stationary at levels (i.e. they should be integrated of the order 1(1).) and the use of leveled data for the test.

In chapter three the model specification was provided along with the null and alternative hypothesis, thus this chapter attempts to test this relationship empirically by estimating the proposed model.

5.1 Co-integration test

The co-integration test of Kao (1999), which is the best test for panel data with cross-sectional dependency as compared to the commonly used Pedroni (1999) test of co-integration, was conducted and the null hypothesis for this test is no co-integration, while the alternative states co-integration. The co-integration test is done to determine if the variables are co-integrated or if they have a long run relationship.

With a probability value of 0.0011 the Kao test definitely rejects the null of no co-integration (t= -3.064281), which means that GDP, GCF, EXP, FDI and UNEMP are co-integrated and have a long run relationship.

5.2 Comparison of different estimators

We estimated the classical fixed effect and random effect models and tables 5.3.1 and 5.3.2 summarize the output obtained from running these traditional models of fixed-effects, which is considered to be always consistent and random-effects models, which is considered to be efficient, respectively. These are regression results before violations have been controlled for. Using the Hausman (1978) test which is a post-estimation test, we were able to determine the appropriate model for each variable but first we had to clearly establish the null and alternative hypothesis for the Hausmans (1978) test which is:

H_0: Random effect model is appropriate

H_1: Fixed effects model is appropriate

The decision criterion for this test in selecting the better of the two models is that if the computed probability value is less than 0.01, 0.05 and 0.10 then we can reject the null hypothesis that claims that the random effect model is an appropriate model. The following table better explains how we came to the conclusion that the fixed effects model was the appropriate model for all but the unemployment (UNEMP) variable. The probability values for EXP, GCF and GDP were all 0.0000 which were all below 0.05 thus we can reject the null making the fixed effects model appropriate. UNEMP however had a probability value of 0.9559 which was greater than 0.05 meaning we cannot reject the null hypothesis stating that the random effects model is appropriate for this variable.

Table 5.1: Hausman test results

Variable	**Chi-square**	**Prob. Value**
EXP	94.387751	0.0000
GCF	124.619957	0.0000
GDP	244.746990	0.0000
UNEMP	0.321777	0.9559

Table 5.2: Regression results - FE model (FDI as independent variable)

Variable	**Coefficients**	**Standard Error**	**T-Statistics**	**Prob. value**	**Adjusted R^2**	**F-statistic**
EXP	**0.446731**	**0.168469**	**2.651703**	**0.0089*** **	**0.992711**	**2255.842**
GCF	**0.514093**	**0.080602**	**6.378167**	**0.0000*** **	**0.995575**	**3725.716**
GDP	**2.306228**	**0.322649**	**7.147784**	**0.0000*** **	**0.996971**	**5450.681**
UNEMP	-6.91E-11	9.84E-11	-0.702351	0.4836	0.983367	979.7902

*Notes: * **bold rows** indicate that fixed effects model is the appropriate one for the variable after the Hausan test was conducted ***p<0.01, **p<0.05, *p<0.10.*

Table 5.3: Regression results - RE model (FDI as Independent variable)

Variable	**Coefficients**	**Standard Error**	**T-Statistics**	**Prob. value**	**Adjusted R^2**	**F-statistic**
EXP	0.343958	0.157023	2.190503	0.0301	0.988210	3123.231
GCF	0.606868	0.075424	8.046134	0.0000	0.991906	4566.030
GDP	3.163087	0.306508	10.31976	0.0000	0.991960	4597.054
UNEMP	**-8.65E-11**	**9.81E-11**	**-0.881661**	**0.3794**	**0.091534**	**4.753181**

*Notes: * **bold rows** indicate that random effects model is the appropriate one for the variable for UNEMP random effects model is appropriate although not statistically significant.*

5.4 Specification and diagnostic tests

Since we made the assumption that the panel is homogeneous, under the reasoning that sample countries are all from the southern part of Africa, making them more alike than if we had sampled countries from across the globe. For this reason a

number of specification tests need to be performed such as tests on heteroskedasticity, auto-correlation and cross-sectional residual correlation.

If these assumptions are violated we need to be aware that the Fixed and Random effects models (traditional panel estimators) that we estimated earlier are not satisfactory as they will provide biased and inefficient results.

5.4.1 Heteroscedasticity

Modified Wald test for group-wise heteroskedasticity in fixed effect regression was computed with the xttest command, which also follows a $\chi 2$ distribution. The null hypothesis homoscedasticity ($\sigma_i^2 = \sigma^2$ for all i (i.e. homoscedasticity, $\sigma_i^2 = \sigma^2$ for i=1,..,N)).The null hypothesis of homoskedasticity is rejected (Table 5.4.1).

Table 5.4: Modified Wald Test

chi2 (6)	= 1.0e+05
Prob>chi2	= 0.0000

(H_0: $\sigma_i^2 = \sigma^2$ for all i)

5.4.2 Autocorrelation

To check for any presence of serial correlation the Wooldridge test for autocorrelation was conducted. The null hypothesis of this test is no serial correlation and it takes after an F distribution. The Wooldridge test fails to reject the null hypothesis of no first-order autocorrelation.

Table 5.5: Wooldridge test

F(1, 5)	= 0.042
Prob > F	= 0.8461

(H_0: no first-order autocorrelation)

5.4.3 Cross-sectional residual correlation

The Breusch-Pagan LM test of independence which follows a $\chi 2$ distribution determines if the variances across countries are not correlated. This test of independence was computed on stata with the xttest2 command, depicting the cross-sectional correlation and has a null hypothesis of uncorrelated residuals.

Table 5.6: Breusch-Pagan LM test of independence

chi2(15)	=	18.960
Pr	=	0.2156

(H_0: residuals are not correlated)

The results above show that the data is characterized by cross-sectional dependency, heteroscedasticity and no autocorrelation this means that some of the tests fail to reject the null of no specification problems. The Breush-Pagan LM test does not reject the null of uncorrelated residuals across cross sections; the Modified Wald test results encourage the rejection of the null hypothesis of homoscedasticity which is the more desirable outcome compared to the alternative of heteroscedasticity and the Wooldridge test fails to reject the null hypothesis of no auto-correlation which means the error terms are random and distributed independently across the observations. In Chapter 3 we also detected cross-sectional dependence thus we need to use a robust regression estimation technique to account for the assumptions that have been violated.

5.5 Regression results

Given the presence of heteroskedasticity and cross-sectional dependency, Hoechle (2007) suggested that these violations can be controlled for by using a fixed effect regression model by Driscoll and Kraay (1998) estimator that provides standard errors that are robust to several events (i.e. specification problems) and also provide

valid statistical inference. Our assumption is that the difference in the results compared to the classical fixed and random effects regression will only be by a small margin.

As reported earlier in this paper we have conducted the traditional estimation regressions for a panel analysis but they have proven not to be sufficient with the presence of heteroscedasticity, cross-sectional dependence and other possible assumptions we have not tested for, thus table 5.5.1 affords us with the Driscoll and Kraay estimation model that makes up for these shortfalls.

Table 5.7: Regression results for Driscoll and Kraay (1998) estimation model (FDI as Independent variable)

Variable	**Coefficients**	**Drisc/Kraay Standard Error**	**T-statistics**	**Prob. value**	**Within R^2**	**F-statistic**
EXP	0.4467307	0.168468	2.65	0.009	0.9752	1375.05
GCF	0.2304945	0.1106515	2.08	0.039	0.9679	1419.06
GDP	2.306218	0.3226487	7.15	0.000	0.9863	2518.15
UNEMP	-6.91e-11	9.84e-11	-0.70	0.484	0.1430	5.84

5.6 Interpretation of driscoll - kraay results

From the output results gathered, the coefficient of EXP is 0.4467307 indicating that there is a positive relationship between EXP and FDI with the inference that with every unit increase in FDI, EXP is predicted to be accompanied by a 0.4467307 units increase *ceteris paribus* (as we are holding GDP, GCF and UNEMP constant).

The coefficient of GCF which we found to be 0.2304945 also shows a positive relationship between GCF and FDI interpreted as if there is a one unit increase in FDI then GCF is expected to increase by 0.2304945 *ceteris paribus*.

GDP seems to be most affected by the volume of FDI inflows in SADC because it's computed coefficient value was 2.306218 demonstrating a positive relationship with FDI. Also interpreted as, for every unit increase in FDI, GDP is estimated to increase by 2.306218 *ceteris paribus*.

The variable that was on the other end of the spectrum showing a negative relationship with FDI was UNEMP, modeling a figure of -6.91e-11. For every unit increase in FDI inflows in SADC, the unemployment rate is expected to fall holding all other factors in the model constant but not by a significant amount after converting the scientific notation to real numbers.

According to Babbie (2007), the standard error is a significant piece of information as it points out the degree to which the sample estimates will be distributed around the population parameter.

The standard error results of the regression coefficients for EXP, GCF, GDP and UNEMP which are 0.168468, 0.1106515, 0.3226487 and 9.84e-11 respectively indicate that Driscoll–Kraay standard errors are well standardized with the presence of cross-sectional dependence.

The t-statistic helps in the determination of whether or not FDI as a sole independent variable is irrelevant to each of the four regressions specified at the end of chapter three (i.e. if FDIs coefficient is in actual fact equal to 0).

Absolute t-stat values of 2 or more mean the 95% confidence interval of the coefficient does not include the value 0, but the greater the absolute value, the better. The equations whose dependent variables were EXP, GCF and GDP had t-statistic

values ranging from 2.08 to 7.152 meaning FDI was relevant is explaining the variation in these variables individually.

The equation where UNEMP was the dependent variable on the other hand had a t-statistic of -0.70 meaning FDI was not a relevant variable to explain variations in the unemployment rate of SADC countries between the years 1991 to 2015.

We can state that from the above output regression results FDI significantly affects EXP, GCF, GDP but not UNEMP.

Chapter 6

CONCLUSION

The purpose of this study was to examine empirically if there indeed lies a nexus between FDI, GDP, GCF, EXP and UNEMP and this connection being that FDI has a significant influence on the other variables. The study used panel data for the period of 1991-2015. It also explored the possibility of a long-run association between the variables.

The summarized findings are that using the panel appropriate unit root tests such as the Levin, Lin & Chu, PP Fischer and Im-Pesaran-Shin to test the stationarity of the series the results revealed that the variables were stationary after first differencing. This also implied that the Johansen co-integration test was applicable, which was conducted and gave forth results of co-integration and the existence of a long-run equilibrium relationships between among the variables in the study. The data also found no presence of multi-collinearity which is a desirable outcome. Specification tests detected heteroscedasticity, but no autocorrelation or the correlation of residuals.

My closing remarks are that the results presented after using cross-sectional and panel specifications along with appropriate estimation methods the results obtained make economic sense because FDI is believed to boost a host country's GDP, stimulate their exports and encourage domestic investment. Since the explanatory

power for the effect of FDI on the unemployment rate is low and the results show that there is an insignificant relationship, we are not certain if FDI inflows can be said to help decrease the unemployment rate in SADC. The results raise a question as to why FDI inflows during this period was insignificant in SADC since we know GDP and UNEMP have a close relationship. This relationship is best described by Okun's law and it states that output depends on the amount of labor used in the production process, so there is a positive relationship between output and employment. Thus if FDI inflows increase GDP significantly then we also expect unemployment rate to decrease significantly. The results we obtained don't convey this and this might be due to the fact that maybe during the years 1991-2015, SADC was producing only technologically intensive and not labor intensive goods and servies.

Our findings do not align with the early studies of FDI by Singer (1952) and Prebisch (1968) that state that FDI has no effect on the host country, but they do align with more recent studies like those of Nair-Reichert and Weinhold (2001), which states that FDI has a significant and positive impact on host countries.

The findings do not modify the existing literature about the expected effect of FDI on different macroeconomic variable but it certainly makes an attempt to add to the existing frame of literature by finding that this effect is also true for the SADC community.

My general recommendation to attract more FDI inflows are to make all countries more politically stable which is something the governments have some control over unlike the other determinants of FDI inflows such as exchange rates and inflation

rates. From the results the impact of FDI inflows on each of the macroeconomic variables individually are very low although they were expected to be a bit higher and this may be due to corruption, poor management of these inflows, the economies of these SADC countries not being properly integrated into the world economy or the lack of proper economic policy to allocate the inflows which are all a common case of many African countries. The policy recommendations would depend on which areas SADC is most interested in improving. For instance if SADC is most concerned about the unemployment rate in the region it should create an environment which will attract foreign direct investment to invest in other sectors that are more labor intensive which will help alleviate the unemployment rate. If SADC is concerned about tackling both GDP and UNEMP at the same time they can either educate the citizens of the region to be able to more skilled, enabling them to work more efficiently with the FDI inflows that come into the region in the form of technology or management, this will in turn also help reduce poverty in the region.

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