

## The Determinants of Foreign Direct Investment Inflows in South Africa: An Application of the Johansen Co-integration Test and VECM

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**ABSTRACT** This study attempts to identify the determinants of FDI inflows into South Africa using quarterly data for the period from 1980 to 2012. Based on the literature review, the Johansen cointegration test which is a VAR based model was adopted and applied to analyse the relationship between FDI and its determinants in the study. The empirical results revealed that GDP, openness, inflation, exchange rate, corporate tax and the financial crises are important determinants of FDI inflows in South Africa. The results from the study imply that policies aimed at promoting growth should be pursued to attract more FDI into the country given the low levels of savings being experienced by the country. However it was pointed out that there is need to mobilise domestic savings in the country given that events outside the country such as the global financial crisis have an effect on the flow of FDI to the country.

### INTRODUCTION

The importance of Foreign Direct Investment (FDI) to a developing country cannot be underestimated. This is clearly indicated by the large number of academic studies that focus on this topic, such as those by Adefeso and Agboola (2012), Wafure (2010), Jayasekara (2014), Siew-Ling (2016), Mosallamy et al. (2016), Rozina (2016), Kariuki (2016), Abdelbagi (2016) and others.

The term 'inflow of FDI' refers to foreign firms making direct investments in a host country. FDIs are currently of particular interest because they play a major role in creating employment, allowing local companies to gain access to international markets, developing managerial skills, fostering improvements in productivity and transferring technology to local firms, all of which will eventually boost the domestic economy. Moreover, in developing economies, FDIs perform the critical functions of supplementing domestic savings, generating employment and growth. This, in turn, leads to integration of the local economy into the global economy, the transfer of modern technologies, and the enhancement of local skills (Anyanwu 2012).

Due to the generally low levels of savings and investment in South Africa, FDIs are considered to be an important catalyst for investment and economic development. Currently, de-

spite South Africa's efforts to attract investors, its level of FDI remains low relative to emerging markets in other countries. In this context, this study seeks to establish the key determinants of FDI inflows into South Africa.

According to Rusike (2007), South African authorities have tried to ensure that FDI drives economic growth. They have done this by putting in place policies designed to attract foreign investors. These policies include the reduction of tax burdens and import tariffs, allowing for easier exchange and return of profits and helping to alleviate the country's overall socio-economic difficulties.

After its first democratic elections in 1994, South Africa was able to enter into various trade agreements with other countries, to reduce trade barriers and to implement sound monetary and fiscal policies. These efforts now seem to have been in vain: the country has attracted very little foreign investment since then (Arvanitis 2006). In the 1980s, the lack of foreign investment was attributed to political instability and expected to improve after 1994. However, according to Arvanitis (2006), this period was followed by the financial crisis of 2007-2008, the tightening of capital controls and the declaration of a moratorium on payments to external creditors. These developments effectively cut South Africa off from international capital markets.

Research by the United Nations Conference on Trade and Development (UNCTD) in 2011 shows that FDI inflow in South Africa decreased by 24 percent amounting to a 9.9 percent share of Africa's FDI inflows for 2011 and 2012. This was attributed to a decrease in investment in South Africa.

Research thus far indicates that attracting foreign direct investors is one of the ways South Africa can keep up with other emerging economies, given the low levels of savings the country is experiencing. The study thus seeks to establish the determinants of FDI inflows into South Africa. The study will be made up of six sections, the introduction being the first section, section two providing trends in FDI inflow in South Africa, literature review presented in section three with section four, five and six presenting the methodology utilized in the study, empirical results and conclusions and recommendations of the study respectively.

### **An Overview of Foreign Direct Investment in South Africa**

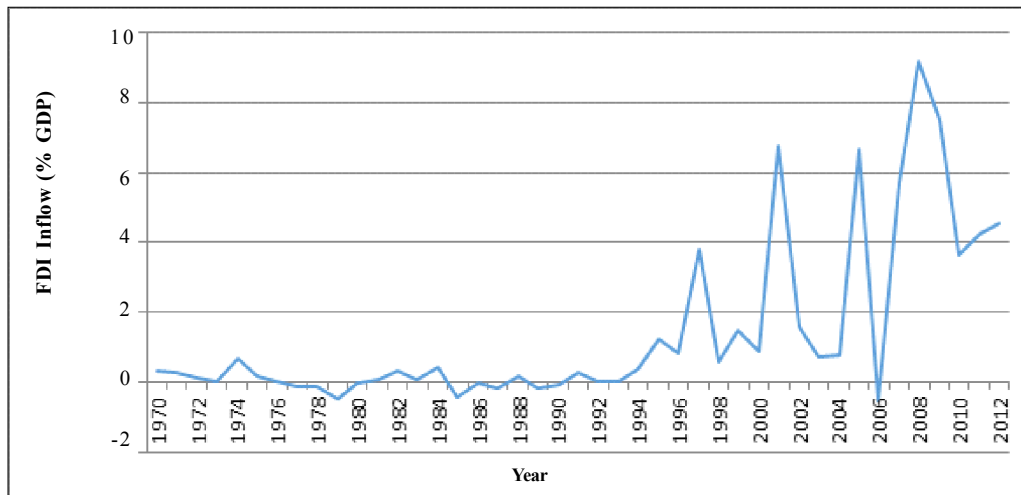
#### ***FDI Inflows in South Africa***

After 1994 the country implemented a policy aimed mainly at ensuring stable economic growth (Gelb et al. 2009). This policy was the Growth Employment and Redistribution (GEAR) Policy,

which was announced in June 1996. The aim of the policy was to improve macroeconomic factors, including the fiscal deficit, inflation and changes in tariffs and in the financial system generally. It was reasonable to focus on economic growth to secure a stable economy, but it was a mistake to believe that foreign capital would improve as a result of the narrowly-focused policy. This is evident from the country's low FDI inflows, regardless of the policies implemented. However, given that the country had total inflows as low as a total of 0.49 percent between 1989 and 1990, and that they increased to 3.58 percent between 2001 and 2010 is proof that inflows are improving, but at a slow rate, as indicated in Figure 1 (UNCTD 2014).

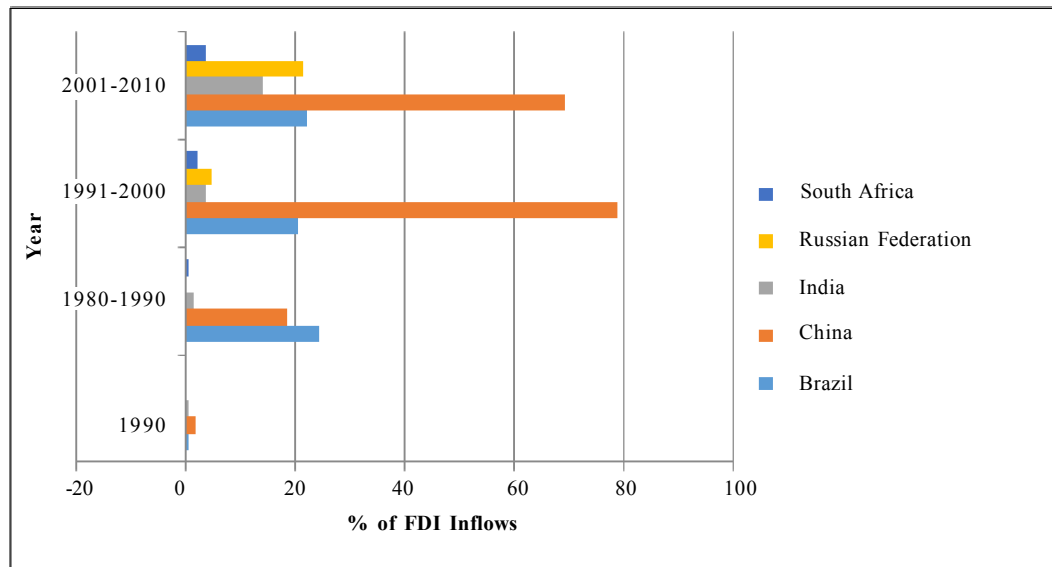
Figure 1 highlights the volatility that has existed in South Africa's FDI inflows, especially after 1994. Economists believe that these are the result of the transition from the apartheid regime to a democratic government, which introduced changes in economic policies and regulations.

Figure 2 indicates that South Africa performs very much worse than any of the other BRICS countries in receiving inflows into the economy, lagging behind India. China has always received the bulk of the inflows, although, in contrast to South Africa, it was not open to foreign investment before 1979. In the early 1980s China moved from restrictive to liberal policies, then to policies encouraging FDI in general. In the mid-1980s it introduced policies that encouraged more high-



**Fig. 1. Trend in FDI inflows into South Africa (1970 – 2012)**

Source: UNCTD (2014)



**Fig. 2. FDI Inflows Annual (%) Measured in US Current Prices; BRICS Countries (1980 -2010)**  
 Source: UNCTD (2014)

tech and more capital-intensive FDI projects. In the mid-1990s, according to Morrison (2012) and Chunlai (1997), economic zones were established and given incentive policies to ensure sustainability of FDI inflow into the country. Despite these efforts, the spillover effects did not materialise as expected, leading to another change in policies. The new policies and regulations produced remarkable results that have accelerated since 1992, reaching the highest inflows of \$72 billion, recorded in 2000. The main reason why China has become the leading economy to attract FDI inflows is its stable economic growth, and it is able to achieve this economic growth, which is partly explained by the high levels of savings in the country.

### Literature Review and Theoretical Framework

Dunning (1981) developed a paradigm, which examines three possible advantages of FDI: ownership-specific (O), location-specific (L), and internalisation (I), so it is generally referred to as the OLI Framework. This theory was relatively able to explain FDI inflows for the purpose of the study.

The ownership-specific (O) advantage ensures that the country has a monopolistic advantage through resources such as human capital, patents, technologies, branding and goodwill.

The location-specific (L) advantage ensures that, for the above-mentioned advantages of ownership, the location must be viable to allow the economy to boom, in the sense that there is political stability, viable social services, developed technology, proper infrastructure and access to cheap input and minimal trade barriers. Internalisation (I) will ensure that ownership and location are sufficient to produce the desired outcomes: to monopolise on the market imperfection and to get the market share or profits, which will, in return, ensure FDI inflows into the host country (Gichamo 2012). Xinzhong (2005) highlighted that ownership and internalisation advantages belong to supply-side factors, resulting in location advantages being a demand-side factor.

Starting with the work of Bevan and Estrin (2000), the authors investigated FDI determinants in transitional economies of central and Eastern Europe. The analysis used panel data sets containing information on FDI flows from 18 countries within the region over the period 1994 to 1998. The study established that FDI inflows are determined by country risk, unit labour costs, host market size and gravity factors. The announcements of progress in EU accession have a direct impact on FDI receipts because of attributes to political stability of the economy, resulting to changes in credit ratings.

Haufler and Stöwhase (2003) argue that there is a need to understand the complex interrelationships between individual elements of potential host countries' tax systems and sector or activity specific FDI flows in a study for the period 1982 to 2001 in Europe. Their findings indicate that investments in different sectors respond with rather different elasticity to tax incentives, and FDI undertaken for different purposes will respond in qualitatively different ways to specific tax incentives such as a low statutory tax rate or generous depreciation allowances. The study recommends that tax as a determinant of FDI inflow needs to be understood from the perspectives of the host and source countries, as well as the motive for acquiring FDI. However Herger et al. (2010) argue that the effect of tax on FDI inflows differs according to the investment strategies pursued by multinational firms.

In recent work by Agrawal (2015), it is proposed that there is a positive long-run relationship between FDI inflows and economic growth in BRICS countries over the period 1980-2012. The results also indicate a relationship of bidirectional causality between FDI inflows and economic growth, meaning that FDI inflows induce economic growth and economic growth induces FDI inflows in BRICS countries. The results suggest that an economy can focus efforts on either economic growth or FDI inflows, since one of them appears to induce the other.

Vijayakumar et al. (2010), investigating the determinants of FDI in BRICS countries for the period 1975-2007, found that market size, cost of labour, infrastructure facilities, currency value and GCF act as the additional determinants of FDI inflows after economic stability, growth prospects and trade openness in BRICS countries. Vijayakumar et al. (2010) concluded that the BRICS economies need to improve investment in order to attract higher FDI inflows, thus facilitating improvement in market potential, infrastructural development and capital formation.

Esso (2010) employed cointegration and causality approach in analysing the long-run relationship between FDI and Economic growth in five African countries, Angola, Liberia, Senegal, Kenya and South Africa from 1970 to 2007. The results indicated that there was a long-run relationship between FDI and economic growth in all the targeted countries, except for Kenya. Moreover, GDP affected FDI significantly and

positively in Senegal and South Africa. There was a significant link between FDI and economic growth, suggesting that FDI caused economic growth in Angola and Kenya; however, in Liberia and South Africa, growth causes FDI inflows (Esso 2010). These findings were contradicted by the findings of Mazenda (2012) in a study that analysed the effect of FDI on economic growth in South Africa from 1980-2010 and concluded that there is a negative relationship between FDI inflows and economic growth.

Suliman and Mollick (2009) argue that, in addition to trade liberalisation or economic and trade policies determinants, human capital development and the incidence of war affected FDI flows to sub-Saharan African countries. The study focused on the determinants of FDI for a sample of 29 sub-Saharan countries from 1980-2003. The findings indicated that a positive relationship between FDI inflows and literacy rate (proxy for educational level), improvement in political rights (proxy for freedom) and civil liberties increased FDI inflows. War events have a significantly negative effect on FDI flows into sub-Saharan African countries. Suliman et al. (2009) asserts that slow-growing literacy rates and continuing political instability need to be major concerns for the development of effective FDI policies for sub-Saharan African countries.

Asiedu (2002) analysed determinants of FDI inflows in developing countries with the aim of establishing whether or not Africa was different during 1970 to 2000. This was a comparative analysis between non-sub-Saharan African and Sub-Saharan African countries. The results indicated that, firstly, a higher return on investment and infrastructure had a positive impact on FDI in non-sub-Saharan African countries, but had no significant impact on FDI in sub-Saharan African. Secondly, openness to trade promotes FDI in sub-Saharan African and non-Sub-Saharan African countries. It is important to note that these results imply that Africa is different to some extent; therefore policies that have been successful in other regions may not be equally successful in Africa.

Macias and Massa (2009) did a study of the global financial crisis and sub-Saharan Africa, exploring the effect of financial crisis on capital inflows over the period 1980 to 2007. The study highlighted that global financial crisis impacts negatively on FDI inflows. The results also indicated a positive relationship between FDI in-

flow and economic growth. These results further illustrate the impact of the global financial crisis on economic growth, since the crisis affected FDI inflows and affected sub-Saharan Africa's growth. Gould and Tan (2013) also agreed that the global financial crisis affected FDI inflows for both developing and developed economies.

A comparable study by Arvanitis (2006) examined determinants of FDI inflows into South Africa. Panel data across 17 countries for the period 1984-2001 were used. Another 16 countries were also included: China, Colombia, Costa Rica, Egypt, Guatemala, India, Korea, Malaysia, Mexico, Morocco, Panama, Philippines, Poland, Thailand, Tunisia and Uruguay. The study included a unique variable, financial risk index, among others. The results indicated that GDP, infrastructure, openness and exchange rates are the drivers of the FDI in an economy. The study also asserted that tax levels indicated the fiscal burden in an economy and it discouraged FDI when the exchange rates indicated the location of investment, in support of the Eclectic Theory. Financial risk reflected mixed results: in some countries it was a negative factor, in others it was positive. Overall, the results indicated that all fixed factors tended to determine FDI inflows into South Africa. Infrastructure includes roads, ports, railways and telecommunication systems to institutional development. These enable investors to do business in the hosting country, allowing investors to cut costs as possible (Anyanwu 2012).

## RESEARCH METHODOLOGY

### Model Specification

The analytical framework used in this study is based on the Eclectic Paradigm discussed in the previous chapter. The model is augmented with other variables to take into account key macroeconomic activities in South Africa. The model also accounts for the motives for countries or firms to decide to undertake foreign investments. The framework regards FDI as a way of transferring foreign capital not limited to goods and services. According to Dunning (1981), the Eclectic Paradigm remains a useful and robust general framework for explaining and analysing the economic rationale of international investment.

The study follows empirical work, particularly that of Adeisu (2002), to investigate the determinants of FDI inflows in South Africa. The model will improve on Aseidu's (2002) work by accounting for the possibility of dynamics in FDI determinants modelling. The model specifies FDI as a function of a number of variables as follows:

$$FDI = f(GDP, RER, CPI, GCF, O, CT, D) \dots (1)$$

The empirical model to be used in the study can be estimated as follows:

$$FDI_t = \beta_0 + \beta_1 GDP + \beta_2 RER + \beta_3 CPI + \beta_4 GCF + \beta_5 CT + \beta_6 O + \beta_7 D + u_t \quad (2)$$

Where FDI is Foreign Direct Investment; GDP is Gross Domestic Product; O is Openness; RER is Real Exchange Rate; CPI is Consumer Price Index; GCF is Gross Capital Formation; CT is Corporate Tax and D is Dummy Variable.

### Definition of Variables and Priori Expectations

*GDP* is the proxy of the host market size; this represents the host country's economic conditions and the potential demand for output, and it is an important element in FDI decision-making. Moreover, Rusike (2007) argues that FDI responds positively to the market size once it reaches a threshold level that is large enough to allow economies of scale and efficient utilisation of resources. The study assumes a positive relationship between FDI and GDP. However, according to Rusike (2007), market size will not be very high in mining countries because the final products in such countries are exported.

*RER* is used to measure the effect of exchange rate on FDI inflows. According to Banga (2003) there is mixed evidence on the impact of depreciation of real exchange rates in the host country on FDI inflows. An inconclusive relationship is expected with FDI inflows, as the relationship might be either positive or negative. For example, foreign investors may gain or lose from a devalued exchange rate. However, foreign investors might not enter the country if they believe that depreciation may continue after they have done. A negative relationship will be expected between FDI inflow and RER in South Africa.

### Openness

In the literature, the ratio of trade to GDP is often used as a measure of the openness of a

country and is also often interpreted as a measure of trade restrictions. This proxy is also important for foreign direct investors who are motivated by the export market. Empirical evidence obtained by Hailu (2010) backs up the hypothesis that higher levels of exports lead to higher FDI inflows. The study therefore includes trade/GDP in the regression in order to examine the impact of openness on FDI inflows.

### **Corporate Tax**

Taxes are obviously a very important factor for companies when they are making their investment decisions (Nikula and Kotilainen 2012). This study measures corporate taxes, as taxes on income, profits and capital gains, as a percent of GDP. A negative relationship is expected between FDI and corporate tax, because a higher tax reduces the returns of investment.

### **The Consumer Price Index**

This measures inflation and the stability of the macroeconomic variables. A negative relationship is expected between FDI and CPI. This is in line with Bengoa and Sanchez-Robles (2003).

**Infrastructure** will be proxied by the GCF and is expected to have a positive relationship with FDI inflows because good-quality, well-developed infrastructure increases the productivity of investments in a country, and therefore stimulates FDI inflows. Essentially, good infrastructure means that investors are able to transport products cheaply, efficiently and safely.

**A dummy variable** will be used to capture the effect of financial crises before and after 2008. Prior to 2008, the dummy variable will have a value of zero, and after 2008 a value of 1. A negative relationship will be expected between the dummy variable and FDI inflows.

### **Data Sources**

Data used in the study relate to the period 1980-2012, in annual series. The choice of the study period is to capture the period when the South African economy had access to international finance after the abolition of apartheid. It was during this period that the country's financial sector was liberalised. Data for the variables was obtained from the South African Reserve Bank and UNCTD.

### **Cointegration Tests**

Once the order of integration of the variables has been established, cointegration tests were performed, using the Johansen Cointegration Test. Cointegration tests will help to establish if there is a long-term relationship between the variables. However before testing for cointegration, the lag length to incorporate in the model will be selected empirically. This will ensure that the model avoids spurious rejection or acceptance of estimated results and to have standard normal error terms that do not suffer from non-stationary, autocorrelation or heteroscedasticity.

In order to choose appropriate lag length for the model, information criteria are used. Various information criteria are available, such as Akaike's Information Criterion (AIC) (Akaike 1973), Schwarz's Information Criterion (SIC) (Schwarz 1978), the Hannan-Quinn Criterion (Hannan and Quinn 1979) and the Final Prediction Error (FPE) (Akaike 1970). AIC has been popularly adopted in economic studies because most of the times it produces a white-noise residual (Mazenda 2012). Suggesting that the criterion has the ability to pick up the correct lag length at least half of the time in a small sample, and its performance increases substantially as the sample size grows.

The Johansen Cointegration Test to be used in the study is discussed below. Assuming that  $X_t$  is the  $n \times 1$  vector of variables, the intra-impulse transmission process of which is to be captured by the study, the dimension of  $X_t$  (that is  $n$ ) is 7, given the seven variables of the analysis. Using matrix algebra notations, a 7-variable structural dynamic economic model for the study can be stated as:

$$BX_t = \mu + \Gamma X_{t-1} + \varepsilon_t \quad \dots (3)$$

Where B is the matrix of variable coefficients

$X_t$  is the  $7 \times 1$  vector of observations at time  $t$  of the variables of the study that is vector X is defined as

$$X_t = (GDP_t, RER_t, CPI_t, GCF_t, CT_t, O_t, D_t) \quad (4)$$

The Vector Error Correction Model (VECM) was estimated to analyse the joint behaviour of the series in the dynamic system. The VECM specification provides both short-run and long-run adjustments. The short-run provides the error correction model (ECM). The ECTt-1 will be expected to be negative and statistically signifi-

cant as evidence that in the event that there is disequilibrium in the short-term, the variables will adjust to their long-run equilibrium.

The VEC model matrices are specified below:

Where, the  $\alpha$  represents the short term dynamics with the  $\beta$ s representing the long run cointegrating vectors.

**Variance Decomposition**

Variance Decompositions were also constructed in the study. Variance Decomposition analysis indicates the proportion of movements in the dependent variables that are due to its own shocks, against shocks to other variables (Brooks 2002). The variance decomposition analysis provides information relative to each random movement in the variables in the model.

The Granger Causality Test was carried out to determine any correlation between FDI and others variables. The model assumes that time series involved in the analysis are stationery and is sensitive to lag length selection, hence the need for conducting stationarity tests and determining the proper lag length as discussed earlier. Thus, the test tried to establish the causality relationship between changes in FDI inflows and changes in GDP in South Africa. Thus the causality test was performed to identify the existence and nature of the causality relationship between the variables (FDI and GDP).

**RESULTS AND DISCUSSION**

**Descriptive Statistics**

Table 1 reports the summary statistics for all the variables used in this study. The mean value of the FDI inflows variable is 10, with a standard deviation of 1. It is interesting to note that the mean value of all the variables in the model is positive; GCF with the highest value of 13, followed by GDP and openness with 12, suggesting that South Africa experienced an increase in FDI inflows during most of the years under consideration. The mean of the dummy variable is the lowest, at 0.2, with the standard deviation of 0.4 indicating that financial crises contributed positively to FDI inflows. While the descriptive statistics show clearly that South Africa’s FDI inflows are different, it also points to the fact that other factors may be at play in explaining the low FDI inflows. This issue is covered in the empirical analysis and these results are inconclusive at this stage, to clearly indicate the determinants of FDI inflows.

**Unit Root Tests**

Tables 2 reports the statistics for the unit root test based on the Augmented Dickey Fuller (ADF) and Phillips Peron (PP) tests.

$$\begin{bmatrix} \Delta \text{LogFDI}_t \\ \Delta \text{LogGDP}_t \\ \Delta \text{LogRER}_t \\ \Delta \text{CPI}_t \\ \Delta \text{LogGCF}_t \\ \Delta \text{LogCT}_t \\ \Delta \text{LogO}_t \\ \Delta D_t \end{bmatrix} = \begin{bmatrix} d_{11} & d_{12} & d_{13} & d_{14} \\ d_{21} & d_{22} & d_{23} & d_{24} \\ d_{31} & d_{32} & d_{33} & d_{34} \\ d_{41} & d_{42} & d_{43} & d_{44} \\ d_{51} & d_{52} & d_{53} & d_{54} \\ d_{61} & d_{62} & d_{63} & d_{64} \\ d_{71} & d_{72} & d_{73} & d_{74} \\ d_{81} & d_{82} & d_{83} & d_{84} \end{bmatrix} \begin{bmatrix} D_1 \\ D_2 \\ D_3 \\ D_4 \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} & \gamma_{16} & \gamma_{17} & \gamma_{18} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} & \gamma_{26} & \gamma_{27} & \gamma_{28} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} & \gamma_{36} & \gamma_{37} & \gamma_{38} \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44} & \gamma_{45} & \gamma_{46} & \gamma_{47} & \gamma_{48} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & \gamma_{55} & \gamma_{56} & \gamma_{57} & \gamma_{58} \\ \gamma_{61} & \gamma_{62} & \gamma_{63} & \gamma_{64} & \gamma_{65} & \gamma_{66} & \gamma_{67} & \gamma_{68} \\ \gamma_{71} & \gamma_{72} & \gamma_{73} & \gamma_{74} & \gamma_{75} & \gamma_{76} & \gamma_{77} & \gamma_{78} \\ \gamma_{81} & \gamma_{82} & \gamma_{83} & \gamma_{84} & \gamma_{85} & \gamma_{86} & \gamma_{87} & \gamma_{88} \end{bmatrix} \begin{bmatrix} \Delta \text{LogFDI}_{t-1} \\ \Delta \text{LogGDP}_{t-1} \\ \Delta \text{LogRER}_{t-1} \\ \Delta \text{CPI}_{t-1} \\ \Delta \text{LogGCF}_{t-1} \\ \Delta \text{LogCT}_{t-1} \\ \Delta \text{LogO}_{t-1} \\ \Delta \text{LogD}_{t-1} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} & a_{15} & a_{16} & a_{17} & a_{18} \\ a_{21} & a_{22} & a_{23} & a_{24} & a_{25} & a_{26} & a_{27} & a_{28} \\ a_{31} & a_{32} & a_{33} & a_{34} & a_{35} & a_{36} & a_{37} & a_{38} \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} & a_{46} & a_{47} & a_{48} \\ a_{51} & a_{52} & a_{53} & a_{54} & a_{55} & a_{56} & a_{57} & a_{58} \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & a_{66} & a_{67} & a_{68} \\ a_{71} & a_{72} & a_{73} & a_{74} & a_{75} & a_{76} & a_{77} & a_{78} \\ a_{81} & a_{82} & a_{83} & a_{84} & a_{85} & a_{86} & a_{87} & a_{88} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} & \beta_{18} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} & \beta_{27} & \beta_{28} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} & \beta_{38} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} & \beta_{47} & \beta_{48} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} & \beta_{57} & \beta_{58} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} & \beta_{67} & \beta_{68} \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & \beta_{75} & \beta_{76} & \beta_{77} & \beta_{78} \\ \beta_{81} & \beta_{82} & \beta_{83} & \beta_{84} & \beta_{85} & \beta_{86} & \beta_{87} & \beta_{88} \end{bmatrix} \begin{bmatrix} \text{LogFDI}_{t-1} \\ \text{LogGDP}_{t-1} \\ \text{LogRER}_{t-1} \\ \text{CPI}_{t-1} \\ \text{LogGCF}_{t-1} \\ \text{LogCT}_{t-1} \\ \text{LogO}_{t-1} \\ D_{t-1} \\ C \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix}$$

**Table 1: Summary Statistics**

	<i>LFDI</i>	<i>LGDP</i>	<i>LGCF</i>	<i>LCPI</i>	<i>LEFF- ECTIVE- EXCH- ANGE- RATE</i>	<i>LCOR- PORA- TE_TAX</i>	<i>LOPEN- NESS</i>	<i>DUMMY- VARI- ABLE</i>
Mean	10.27	14.47	12.65	4.607	4.586	3.071	12.364	0.212
Median	9.65	14.42	12.53	4.705	4.571	3.144	12.434	0.000
Maximum	12.09	14.90	13.34	5.197	4.918	3.540	14.441	1.000
Minimum	8.954	14.19	12.18	3.683	4.284	2.573	10.210	0.000
Std. Dev.	1.105	0.237	0.366	0.480	0.133	0.259	1.343	0.415
Skewness	0.411	0.516	0.648	-0.601	0.331	-0.449	-0.063	1.408
Kurtosis	1.551	1.811	2.069	2.057	3.391	2.142	1.721	2.983
Jarque-Bera	3.819	3.411	3.503	3.207	0.814	2.118	2.273	10.909
Probability	0.148	0.181	0.173	0.201	0.666	0.346	0.321	0.004
Sum	339.0	477.6	417.5	152.038	151.334	101.358	407.998	7.000
Sum Sq. Dev.	39.07	1.793	4.305	7.381	0.569	2.140	57.676	5.515
Observations	33	33	33	33	33	33	33	33

Table 2 shows obtained results confirming that each series contains a unit root (non-stationary) at level series, except for CPI which is statistically significant at intercept model at 1 percent, using the PP Test, though it is at none model and at 5 percent in when using ADF Test. But FDI inflow, GDP, GCF, exchange rate, openness and corporate tax became stationary at first difference level at both tests. It is worth noticing that CPI has the weakest level of significance of 10 percent and 5 percent at first difference when using the ADF Test and is not significant when using PP, but strongly significant at second difference at 1 percent for both tests. Another point of inconsistency is that GDP obtained a lower level of significance at none model of 5 percent when using PP Test.

Now that order of integrations has been established the next step is to determine the lag length in order to establish cointegration.

Table 3 confirms the lag lengths selected by different information criteria. All the information criteria; include AIC, SIC, Hannan-Quinn Information Criterion (HQI), FPE and the Likelihood Ratio Test (LR) selected two lags, therefore the information criteria approach produced agreeing results to adopt two lags. Subsequently, the Johansen Cointegration Test is conducted using two lags for the VAR. Even though it is simple not to have conflicting results, however too few lags may lead to specification errors and omission of important lag dependences (Asteriou et al. 2007).

Table 4 tabulates the cointegration test's results between variables based on the Johansen approach using a lag length of 2. Trace test and the maximum eigenvalue test evidently generate conflicting results. The trace test indicates at least five cointegrating equations at 5 percent level of the model. On the other hand the maxi-

**Table 2: Unit root test: First Difference Series**

<i>Variable</i>	<i>Augmented Dickey-Fuller Test</i>			<i>Phillips-Perron Test</i>		
	<i>Constant</i>	<i>Trend and constant</i>	<i>None</i>	<i>Constant</i>	<i>Trend and constant</i>	<i>None</i>
FDI inflow	-6.231***	-6.374***	-5.944***	-6.261***	-6.548***	-5.944***
GDP	-4.196***	-4.474***	-2.429**	-4.215***	-4.516***	-2.076**
GCF	-5.125***	-5.139***	-4.088***	-3.858***	-3.849**	-3.492***
CPI	-2.579*	-3.722**	-1.314*	-2.543*	-2.622*	-1.187*
Exchange rate	-5.699***	-5.622***	-5.669***	-6.221***	-6.100***	-5.739***
Openness	-5.826***	-5.774***	-0.367*	-9.693***	-9.854***	-3.215***
Corporate Tax	-5.096***	-5.093***	-5.172***	-5.096***	-5.095***	-5.172***

Note: \*\*\*denotes significance at 1%; \*\* significance at 5% and \* significance at 10%



**Table 3: Lag length selection criteria**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	145.5	NA	0.001	-8.871	-8.501	-8.751
1	400.9	362.5	0.009	-21.21	-17.88	-20.13
2	569.1	151.9*	0.000*	-27.94*	-21.64*	-25.89*

\* indicates lag order selected by the criterion  
 LR: sequential modified LR test statistic (each test at 5% level)  
 FPE: Final prediction error

AIC: Akaike information criterion  
 SC: Schwarz information criterion  
 HQ: Hannan-Quinn information criterion

mum eigenvalue test indicates at least four cointegrating equations at 5 percent level of the model. Even though the results reveal the existence of a long-run equilibrium relationship between the variables, the contracting results are of concern.

**Table 4: Johansen cointegration technique results**

<i>Unrestricted Cointegration Rank Test (Trace)</i>				
Hypothesised No. of CE(s)	Eigen value	Trace statistic	0.05 Critical value	Prob.**
None*	0.522	271.212	159.529	0.000
At most 1*	0.323	178.857	125.615	0.000
At most 2*	0.295	130.065	95.753	0.000
At most 3*	0.258	86.337	69.818	0.001
At most 4*	0.179	48.948	47.856	0.039
At most 5	0.094	24.168	29.797	0.193
At most 6	0.081	11.759	15.494	0.168
At most 7	0.009	1.173	3.841	0.278

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level

<i>Unrestricted Cointegration Rank Test (Max-Eigenvalue)</i>				
Hypothesised No. of CE(s)	Eigen value	Max-Eigen value	0.05 Critical value	Prob.**
None*	0.522	92.354	52.362	0.000
At most 1*	0.323	48.792	46.231	0.026
At most 2*	0.295	43.727	40.077	0.018
At most 3*	0.258	37.389	33.876	0.018
At most 4	0.179	24.780	27.584	0.109
At most 5	0.094	12.408	21.131	0.507
At most 6	0.081	10.586	14.264	0.176
At most 7	0.009	1.1732	3.8414	0.278

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level

Notes:

\* denotes rejection of the hypothesis at the 0.05 level  
 \*\*MacKinnon-Haug-Michelis (1999) p-values

However, the study's main aim is to establish if there is a long-term relationship between

the variables and not necessarily the number of cointegrating vectors, so the null hypothesis of no cointegration was rejected at 0.05 percent level of significance from both the trace statistic and the maximal-Eigen value. This indicated that there is a cointegrating relationship among the variables. Table 5 presents the long-run cointegration results normalised on FDI.

Table 5 shows that nearly all the variables in the model enter the long-run equation significantly, and the signs and magnitudes also appear reasonable based on the model. The results suggest that GDP, GCF, openness, effective exchange rate and dummy variable have a positive impact on FDI inflows in South Africa. However, CPI and corporate tax had a negative effect on FDI inflows in South Africa. The results are explained in detail below.

**Table 5: Long-run cointegrating relationship results normalised on FDI**

<i>Dependent variable FDI</i>			
Regressors	Coefficient	Std error	t-stat
LGDP	53.67	9.64678	5.56367**
LGCF	0.439	1.56893	0.28003
LOppns	3.996	0.78198	5.11042**
CPI	-16.69	3.09784	-5.39028***
EX	1.773	1.80606	0.98209
CTax	-7.294	1.07190	-6.80506**
Dummy	-0.417	0.64255	-0.65003***

### Gross Domestic Product (GDP)

The positive cointegrating coefficient of 53.6 illustrates a positive relationship between GDP and the FDI inflows in that a unit increase in inflation would translate to a 5.3 percent increase in FDI inflows. The results confirm the priori expectations, and are in line with the findings of Mottaleb et al. (2010), Anyanwu (2012), Huand et al. (2012), Jayasekara (2014), Mosallamy et al. (2016), Abdelbagi (2016) and Etim et al. (2014).

GDP is statistically significant in explaining changes in FDI inflows, suggesting that market size is an important factor in attracting FDI inflows into South Africa.

### **Gross Capital Formation**

In the study GCF is used as a factor of investment in the form of infrastructure like roads and electricity. A positive coefficient of 0.43 indicates a positive relationship between FDI inflows and GCF even though the variable is statistically insignificant, implying that a 1 percent change in GCF will render a 43 percent increase in FDI inflows. This confirms the *priori* expectations and findings of Ranjan et al. (2011) in BRICS countries; Rozina (2016), Abdelbagi (2016) and Awan et al. (2014) in Pakistan. This suggests therefore that there is need to invest more in infrastructure development so as to attract more FDI inflows into the country.

### **Openness**

According to the results, the cointegrating coefficient for openness is 3.99, illustrating a positive relationship between the openness and FDI inflows. These results are consistent with the prior expectations and supported by Ranjan et al. (2011), Xin et al. (2012), Jayasekara (2014) and Hlongwana (2015). In addition, the variable is statistically significant. This suggest that multinational companies to South Africa are into export-oriented investments and prefer to locate in a more open economy, since increased imperfections that accompany trade protection generally imply higher transaction costs associated with exporting.

### **Consumer Price Index (CPI)**

The negative cointegrating coefficient of 16.69 as a measure of economic stability shows a negative relationship between CPI and FDI inflows into South Africa. The results agree with *a priori* expectations that macroeconomic instability discourages FDI inflows and is consistent with Çevis et al. (2007), Jayasekara (2014) and Hlongwana (2015). The variable is statistically significant explaining that any macroeconomic instability brings with it economic uncertainty. This will result in foreign investors

becoming sceptical about investing in the country.

### **Effective Exchange Rate**

The positive cointegrating coefficient of 1.77 shows a positive relationship between effective exchange rate and the FDI inflows in South Africa meaning a unit increase in effective exchange rate would translate to a 177 percent increase in FDI inflows even though the variable is statistically insignificant. The results are consistent with Liargovas et al. (2011), Hlongwana (2015) and Thaddeus et al. (2013).

### **Corporate Tax**

The empirical results show that there is a negative relationship between corporate tax and FDI inflows into South Africa. These results are consistent with Jayasekara (2014), Bhavan et al. (2011), Rozina (2016), and Arvanitis (2006) and correspond to the *priori* expectations. The variable is statistically significant, implying that corporate tax is a very important variable determining FDI inflow into South Africa. The empirical results suggest that higher levels of tax discourage foreign investors.

### **Dummy Variable**

The financial crisis captured by the dummy variable has a negative relationship with FDI inflow to South Africa even though it is statistically insignificant. This result is consistent with the *priori* expectations and a number of available studies such as Cuyvers et al. (2008) and Macias et al. (2009). The results suggest that the crisis reduced the amount of FDI inflows to South Africa. Foreign companies, in this case, were concentrating on their parent countries rather than investing in other countries. This, in a way, raises a question about relying on foreign capital for sustainable development, in the event that it is determined by forces outside the country.

### **Vector Error Correction Model**

This section seeks to analyse the short-run effects of an explanatory variable on the FDI inflows into South Africa. The persistence of the analysis is to determine whether the short-

run dynamics are influenced by long-run equilibrium cointegrating vectors.

Table 6 shows the results of short-run VECM based on the value of CointEq1 for every variable in the table. Based on the result of the VECM test, it is found that the value of CointEq1 for the FDI inflows is significant and negative. This proves that the explanatory variables are the long-term Granger cause for FDI inflows. In other words, FDI inflows in the equation bear the burden of dispersed error correction of short term balance to achieve long-term balance as much as 3.9 percent within a quarter.

### Variance Decomposition

Variance decomposition were constructed to further analyse the results from the VAR and the results are reported in Table 7.

The variance decomposition is reported over a period of 36 quarters. The results show that for the period under study, the major source of variation in FDI inflows is own shock, which account for between 57 percent and 100 percent. Approximately 15 percent of a change in FDI inflows is attributable to GDP in the long run. Virtually the GCF explains about 6 percent change, openness 0.23 percent change, CPI 5 percent, effective exchange rate 1.7 percent, corporate tax 7 percent and dummy variable 6 percent change on FDI inflows. Overall, the results

**Table 6: Vector error correction model**

Error correction:	<i>D(LFDI)</i>	<i>D(LGDP)</i>	<i>D(LGCF)</i>	<i>D(LOPEN)</i>	<i>D(LCPI)</i>	<i>D(LEX-CHNG)</i>	<i>D(LCORP)</i>	<i>DUMMY</i>
<i>CointEq1</i>	-0.039 (0.012) [-3.211]	-0.001 (0.001) [-2.421]	0.001 (0.002) [ 0.297]	0.004 (0.005) [ 0.938]	0.001 (0.000) [ 1.495]	-0.005 (0.003) [-1.462]	0.023 (0.004) [ 5.623]	-0.006 (0.008) [-0.752]
<i>D(LFDI(-1))</i>	-0.464 (0.167) [-2.781]	0.006 (0.009) [ 0.745]	0.024 (0.026) [ 0.932]	0.039 (0.064) [ 0.608]	0.002 (0.007) [ 0.285]	0.001 (0.046) [ 0.025]	0.0128 (0.055) [ 0.229]	0.0141 (0.101) [ 0.139]

**Table 7: Variance decomposition**

Period	<i>S.E.</i>	<i>LFDI</i>	<i>LGDP</i>	<i>LGCF</i>	<i>LOPEN</i>	<i>LCPI</i>	<i>IEXCH</i>	<i>LCORPT</i>	<i>DUM</i>
1	0.022	100.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.078	87.910	4.634	1.035	0.672	0.544	0.599	2.266	2.332
10	0.126	68.550	13.612	3.321	0.801	1.798	1.460	6.233	4.219
15	0.158	64.620	14.692	4.233	0.604	2.684	1.701	6.605	4.852
20	0.187	62.350	14.865	5.0806	0.457	3.312	1.767	6.736	5.423
25	0.212	60.180	15.187	5.788	0.357	3.921	1.769	7.046	5.746
30	0.235	58.820	15.243	6.273	0.291	4.426	1.763	7.191	5.985
36	0.260	57.530	15.300	6.729	0.238	4.914	1.754	7.325	6.207

*Cholesky Ordering:* LFDI\_INFLOWS LGDP LGCF LOPENNESS LCPI LEFFECTIVE\_EXCHANGE\_RATE LCORPORATE\_TAX DUMMY\_VARIABLE

emphasise that economic growth is one of the most important factors driving FDI inflows into South Africa. In addition, macroeconomic stability also features as another important variable determining FDI.

The results reflect that there is evidence of uni-directional causality from GDP to FDI. These results are consistent with Agrawal (2015), Liargovas et al. (2011) and Esso (2010) who concluded that there is a causality relationship between FDI and GDP. These results are in line with the long-term cointegration test results.

**Table 8: Granger causality tests**

Granger Causality Excluded	<i>Chi-sq</i>	<i>Df</i>	<i>Prob.</i>
<i>D(LGDP)</i>	2.099	2	0.045
<i>D(LGCF)</i>	2.734	2	0.254
<i>D(LOPENNESS)</i>	0.262	2	0.877
<i>D(LCPI)</i>	0.389	2	0.822
<i>D(LEFFECTIVE_EXCHANGE_RATE)</i>	1.129	2	0.568
<i>D(LCORPORATE_TAX)</i>	0.612	2	0.736
<i>D(DUMMY_VARIABLE)</i>	3.606	2	0.164
<i>All</i>	7.103	14	0.930

### Diagnostic Tests

The residuals were also examined for the normality, autocorrelation and heteroscedasticity and the results are reported in Table 9.

**Table 9: Diagnostic tests**

<i>Test</i>	<i>H<sub>o</sub></i>	<i>Test statistic</i>	<i>P-Value</i>	<i>Conclusion</i>
Jarque-Bera	Residuals are normally distributed	1.070	0.079	Errors are not normally Distributed at 10% level of significance.
VEC Residual Serial Correlation LM Tests	There is no serial correlation in the residuals	3.041	0.786	No serial correlation in the residuals.
VEC Residual Heteroskedasticity Tests	The residuals are homoscedastic	4.644	0.622	No Heteroskedasticity in the residuals.

The results presented in Table 9 shows that the joint Jarque-Bera statistic is 1.070371 with a probability of 0.07, thus the null hypothesis of normality in the residuals is rejected at 10 percent significance level though it is accepted at 5 percent. The LM test for serial correlation test statistic is 3.041615 with a probability of 0.7865. Thus the model is significant at all levels of significance; hence the null hypothesis which states that the error terms are independent is accepted. For heteroscedasticity, the model is significant at 10 percent level of significance. The Chi-square statistic is 4.644000 with a probability of 0.6224. Therefore we fail to reject the null hypothesis that there is homoscedasticity.

### CONCLUSION

In this study, an attempt was made to establish the determinants of FDI inflows into South Africa. Based on the review of the available studies, an empirical model linking FDI and its determinants was estimated. The Johansen cointegration test which is a VAR based model was utilised in the estimation. The Johansen test confirmed the presence of cointegration. Indicating that there is long-term relationships between the variables. GDP and Openness were found to have a positive relationship with FDI inflows into South Africa. On the other hand inflation, exchange rate, corporate tax and the dummy variable which was a measure of financial crisis were found to have a negative relationship with FDI inflows into South Africa. Granger causality tests results also revealed that there is presence of a uni-directional causality from GDP to FDI in South Africa.

### RECOMMENDATIONS

The results reflected that GDP is a very important variable determining FDI inflows into

South Africa. This suggests that South Africa needs to implement policies that will induce a fast-growing economy which is able to attract a greater share of FDI inflows. This is particularly important given the country's has low levels of savings, as FDI can act as a bridge to a more robust and sustainable national economy.

The empirical results also suggested that openness is another important factor determining FDI inflows into South Africa. This implies that the country should continue with policies aimed at enhancing its openness to the outside world, so as to enhance the amount of FDI inflows into the country.

The empirical results also revealed that the financial crisis had a negative effect on FDI inflows. They also suggested that events outside the country's boundaries can significantly reduce FDI inflows into the country. This raises questions about relying on foreign capital which, in the face of a risk, may be reduced. It is therefore advisable for countries like South Africa to mobilise domestic resources so as to reduce reliance on foreign capital, which can be greatly hampered by international risks.

### LIMITATIONS OF THE STUDY

The analysis in the study was much of quantitative in nature. There are other qualitative variables which might have influenced the relationship between FDI and its determinants as which were not taken into account, however where possible relevant narrations were made. However this could not render the results susceptible given that they correspond to the available studies in the subject as well as theory.

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