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Impact of Foreign Direct Investment on Human Development Index in South Africa

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Abstract

Many studies have been done on the impact of Foreign Direct Investment on economic growth and poverty reduction in developing countries, however there is a lack of empirical studies of FDI impact on poverty reduction in South Africa which is the second largest FDI recipients of one of the poorest regions in the world (sub Saharan Africa). We used time series data from 1990 to 2017 with the ARDL method to evaluate the impact of FDI Inflow on HDI in the country. The results show that FDI inflow has no significant impact on HDI both in the short run and long run on the country. This result is consistent with findings reported in the literature.

Keywords: HDI, FDI Inflow, Poverty Reduction, ARDL, Developing Countries

1. Introduction

The globalization of the world gives a good opportunity to MNEs to expand its business in foreign countries in order to maximize their profit. Globalization also offers a good opportunity to developing countries to attract Foreign Direct Investment indispensable for filling the gap between the desired investment and domestic saving to increase economic growth and poverty reduction. Foreign Development Investment attraction became then an essential policy in the development strategies in these countries and we have assisted to a high FDI inflow in developing countries since the 1990s (Mold, 2004) because the human capital and the infrastructure in developing countries essential to the attraction of FDI have improved.

While many authors among academia see FDI as a blessing for developing countries, (Borensztein et al., 1998; De Melo, 1999; Markusen et al., 1999; OECD, 2002; Rodrik, 2000, 1999), some authors also think that foreign investors could also harm domestics firm (Haddad & Harrison, 1993; Aitken & Harrison, 1999).

We have no doubt about the potential of FDI to achieve these goals, however we believe that contexts matter and these impacts may differ from country to country because the policies applied by countries are different and the level of the development of these countries also differs.

In order to contribute to the academic debate of the impact of FDI on development, we chose the case of South Africa for several reasons. First, South Africa is an important recipient of FDI (second after Nigeria) in the poorest region of the world (Sub Saharan African region). The second reason is that there are very limited studies on the subject in the country. And the third reason is that the only paper identified (Magombeyi & Odhiambo, 2017) on the subject in the country found mixed evidence while using different indicators of poverty because of the multidimensional components of poverty.

The contribution of this paper will then be to fill the gap of the impact of FDI on development concerning the case of South Africa by choosing the Human Development Indicator as our dependent variable in order to avoid the mixed evidence found by Magombeyi & Odhiambo (2017). We also believe that this is a good indicator of development because it is a statistic composite index of life expectancy, education and per capita income indicators used by the United Nation Development Program.

We have organized the remainder of our paper in the following. In section two we will develop the literature review of the impact of FDI on development in developing countries through the three continents of development. Section three will be reserved for the data and methodology we will use in the research. In section four, we will present the results of our research and we will finalize the paper in section five with conclusion and recommendations based on our findings

2. Literature Review of the Impact of Foreign Direct Investment on Development

There are many empirical studies conducted on the impact of FDI on poverty reduction.

However, the methodology, the sample and the measure used in the evaluation differ from authors and the availability of data during the period. In this literature review, we will present the finding of these authors in the three developing continents. The summary of the literature review can be found in Table 1 below.

Empirical evidence in Africa

In Africa, we have identified 8 academic papers: Gohou and Soumare (2012), Israel (2014), Gökmenoğlu et al (2018), Tsaurai (2018), Yohanna (2013), Ukamaka et al (2016), and Fauzel (2016) and Magombeyi and Odhiambo (2017).

Gohou and Soumare (2012), Israel (2014), Gökmenoğlu et al (2018), Tsaurai (2018), Yohanna (2013), Ukamaka et al (2016), Fauzel (2016) using different samples, different econometric techniques and different indexes of poverty measures found a positive relation between FDI and poverty reduction in the sense that FDI has a positive impact on poverty reduction in Africa .

Concerning the endogenous variable used for poverty reduction measure, we noticed that apart from Gohou and Soumare (2012), Gökmenoğlu et al (2018) and Fauzel (2016) who used Human Development Index (HDI) as the endogenous variable in their research, other authors used different index of poverty. It is the case of Israel (2014) who used the headcount poverty index, Yohanna (2013) used Per capita income index, Ukamaka et al (2016) used the absolute number of poor people living under the poverty line and Tsaurai (2018) used three measures of poverty namely life expectancy at birth, household consumption expenditure as a ratio of gross national product and mortality rate and infant.

The second difference is that most of these authors also used different econometrics methodologies. Tsaurai (2018), Gohou and Soumare (2012) used panel Data analysis, Yohanna (2013) and Ukamaka et al (2016) used OLS (Ordinary least Square) technique, Israel (2014) used Error Correction Model (ECM) estimation, Gökmenoğlu et al (2018) used the technique of cointegration and Fauzel (2016) used the dynamic vector autoregressive model.

Magombeyi and Odhiambo (2017) in opposite found mixed evidence in their research in south Africa while using three different indicators of poverty namely household consumption expenditure, infant mortality rate, and life expectancy

Empirical evidence in Asia

In Asia, we have identified 6 studies namely Uttama (2015), Shamim et al (2014), Trinh (2017), Agarwal and Atri (2015), Hemmer et al (2012) and Ali et al (2010).

Uttama (2015), Shamim et al (2014), Trinh (2017) Hemmer et al (2012) have investigated the impact of FDI on poverty reduction in Asia and have found that FDI has a positive impact on poverty reduction.

These authors have used various measures of poverty namely Human Development Indicator Uttama (2015), head count ratio (Shamim et al., 2014), the percentage of the population

below the poverty line (Trinh, 2017), head-count index (Hemmer et al., 2012).

They have also used different econometric method namely spatial panel data model technique (Uttama, 2015), ARDL (autoregressive distributed lag model approach) technique and co-integration (Shamim et al., 2014), Panel Data Analysis (Trinh, 2017) and (Hemmer et al., 2012),

The authors that found different results in Asia among the papers we have identified are Agarwal and Atri (2015), Nishat et al (2010).

Agarwal and Atri (2015) evaluated the impact of FDI on poverty reduction in India during the period of 1980-2011. Using the Generalised Least Squares (GLS) technique, their results showed that FDI inflow has a negative impact on poverty reduction. The authors have also extended their analysis in the region in order to compare the performance of India to other countries of the region SAARC (South Asian Association for Regional Cooperation). The results are different in the sense that FDI inflow in other countries of the region reduces poverty.

Ali et al (2010) also found a negative impact of FDI on poverty reduction using ARDL technique time series data and poverty headcount ratio during the period of 1973–2008

Empirical Evidence in others developing countries

In this section, we have identified 6 studies namely Quinonez et al (2018), Calvo and Hernandez (2006), Ucal (2014), Arrabyat (2017), Assadzadeh and Pourqoly (2013), and Huang et al (2015).

Those who found a positive relation between FDI and poverty reduction in their research are Calvo and Hernandez (2006), Ucal (2014), Assadzadeh and Pourqoly (2013). These authors have used the same econometric methodology which is panel data analysis but a different measure of poverty. Calvo and Hernandez (2006) used the headcount index and the poverty gap index, Assadzadeh and Pourqoly (2013) have used the Human Development Index.

Quinonez et al (2018) and Arrabyat (2017) found an insignificant effect on poverty reduction by using a panel data analysis as the econometric model and different measures of poverty. Quinonez et al (2018) have used poverty incidence and Arrabyat (2017) used the Headcount index.

Huang et al (2015) found a negative impact of FDI on poverty reduction in 12 middle-income countries in East and South-East Asia as well as Latin America using panel data technique and the average income of the bottom quintile population as an indicator

Table 1. Summary of the literature review of FDI impact on development

Result	Author, Date	Methodology	Sample	Period	Endogenous Variables
Positive effect	Gaston Gohou and Issouf Soumare 2012	Panel data analysis	52 countries in africa	1990–2007	Human Development Index and GDP per capita
	Nathapornpan Piyaareekul Uttama, 2015	spatial panel data model technique	6 countries of ASEAN region	1995–2011	Human Development Indicator
	Anigbogu, Theresa Ukamaka, Edoko, Tonna David, Okoli, Ikechukwu Moses, 2016	OLS (Ordinary least square) technique	Nigeria	1980-2014	absolute number of poor people living under poverty line
	Adesiyan Olusegun Israel., 2014	Error Correction Model (ECM) technique	Nigeria	1980-2009) .	headcount poverty index
	Ahmad Assadzadeh and Javad Pourqoly, 2013	Panel data technique	20 MENA Countries	2000–2009	Human Development Index
	Korhan K. Gökmenoğlu, Martins Olugbenga Apinran, Nigar Taşpınar, 2018	co-integration technique	Nigeria	1972–2013	Human Development Index
	Panshak Yohanna,2013	OLS (Ordinary least Square) technique	Nigeria	1981-2010	Per capita income
	Nam Hoai Trinh 2017	OLS (Ordinary least square) technique and panel data technique (Fixed effect estimation)	63 provinces of Vietnam	2002-2012	the percentage of the population below the poverty line
	Cesar C. Calvo and Marco A. Hernandez, 2006	Panel data	20 Latin American countries	1984-1998	the headcount and the poverty gap
	Hemmer, Hans-Rimbert; Phuong Hoa, Nguyen Thi, 2002	panel data technique	61 provinces of Vietnam	1990-2000	head-count index
	Sheereen Fauzel, Boopen Seetanah, and Raja Vinesh Sannassee, 2016	VAR approach	Mauritius	1980-2013.	Human Development Index
	Anisa Shamim, Pervaiz Azeem, And Syed M. Muddassir Abbas Naqvi, 2014	ARDL technique. And co-integration technique	Pakistan	1973-2011	head count ratio
	Meltem Şengün Ucal, 2014	Unbalanced panel data technique	26 developing countries	1990-2009	Per capita income
	Kunofiwa TSAURAI, 2018	Panel data technique and generalised methods of moments (GMM)	16 Southern and Western African countries,	2002-2012.	life expectancy at birth, household consumption expenditure as a ratio of gross national product and mortality rate and infant.
Negative effect	Chao-His Huang, Kai-Fang Teng, and Pan-Long Tsaim,2015	Panel data technique	12 middle-income countries in East and South-East Asia as well as Latin America	1970-2005	average income of the bottom quintile population
	Ali, M., Nishat, M. and Anwar, T. 2010	ARDL	Times series data	1973–2008	Poverty headcount ratio
Mixed evidence	Manmohan Agarwal, Pragya Atri, 2015	Generalised Least Squares (GLS) technique	India	1980-2011	Count Ratio (HCR) and Poverty Gap Index (PGI)
	Mercy T. Magombeyi Nicholas M. Odhiambo, 2017	ARDL	South Africa	1980-2014	household consumption expenditure, infant mortality rate , and life expectancy
Insignificant effect	Pablo Quinonez,Joselin Saenz,Jessica Solorzano, 2018	panel data analysis	13 countries of Latin America	2000-2014	Poverty Incidence
	Yaser Ahmad Arrabyat 2017	Unballanced panel data technique	85 developing countries	1980-2012	Headcount index
	Matthew Babatope Ogunniyi, Christiana Ogonna Igberi	OLS	Nigeria	1980-2012	real per Capital Gross Domestic Product

3. Data and Econometric Method

3.1 Data

We used annual times series data on Foreign Direct Investment as a percentage of GDP, Human Development Index, GDP, consumer price index, infrastructure and openness. The data of FDI Inflow come from UNCTAD (The United Nations Conference on Trade and Development). The data of CPI, OPENNESS, INFRAS and GDP come from World Bank Indicators. The data of HDI comes from the UNDP (United Nations Development Program).

The mains variables of interest are HDI, FDI Inflow. Their trends are shown in Figure 1.

Over the years, the HDI index of the country has increased from 0.61 in 1990 to 0.69 in 2017.However the trend of FDI Inflow was not stable over the years as it was at – 0.06 per capita in 1990, 5.97 per capita in 2001 and 0.39 in 2017.

In Figure 1, HDI seems to follow the opposite direction of FDI Inflow during the period of 2009-2017.Before that period the relationship between the trends of these 2 variables was ambiguous.

An econometric estimation becomes then essential in studying the relationship between these 2 variables and evaluating the impact of FDI inflow on HDI

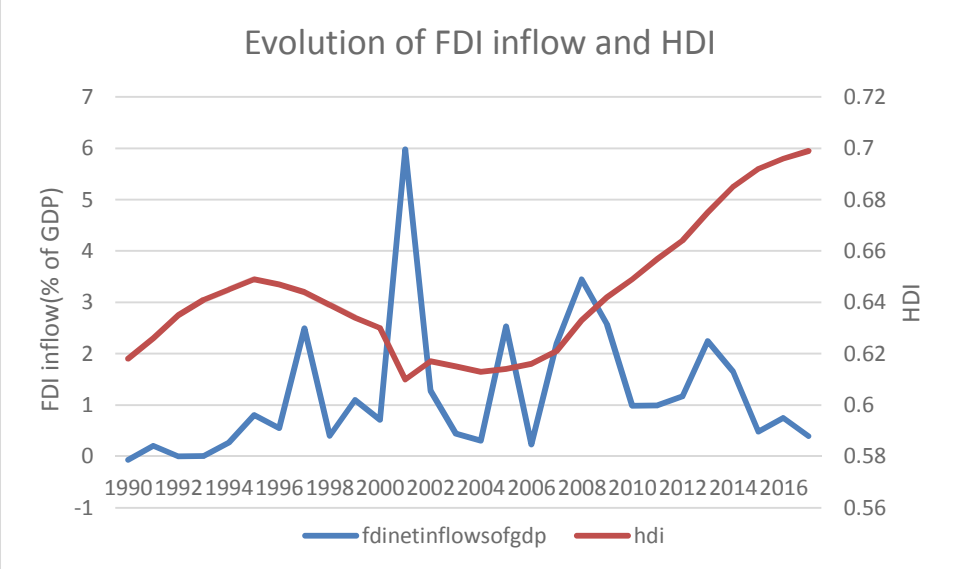

Figure 1. Evolution of FDI Inflow and HDI

3.2 Econometric Method

In order to evaluate the impact of FDI Inflow on HDI in the country, we use the following functional form.

$$HDI = \beta_0 + \beta_1 FDI + \beta_2 GDP + \beta_3 CPI + \beta_4 INFRAS + \beta_5 OPENNESS + \varepsilon_t$$

Many estimation techniques like OLS, ECM, VAR, ARDL have been used in the literature. However, we opted for the autoregressive distributed lag (ARDL) cointegration technique to analyze the long run and short run dynamic interactions between the variables in the model. The technique has been developed by Pesaran et al. (2001) and it is an ordinary least square (OLS) based model applicable for both non-stationary time series as well as for times series with a different order of integration. The model takes enough numbers of lags to capture the data generating process in a general-to-specific modeling framework.

A dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation. The ECM will integrate the short-run dynamics with the long-run equilibrium without losing long-run information. Like any technique in econometric, ARDL is not exempt from critics. On critic the model has received is that in case of the presence of a stochastic (random) trend in the data the dynamics in an ARDL model will be approximating this trend rather than modeling real dynamics.

We have chosen this technique for several reasons. The main reason is that the data sample is small, with only 28 observation points due to the availability of the data. The ARDL technique is suitable for such a small sample (Solarin & Shahbaz, 2013). Another advantage for ARDL is that the variables we are using do not need to be integrated of the same order. Some variables can be integrated of order one and others order zero and even fractionally integrated. The final reason is that the ARDL approach is simple compared to other methods that use a system of equation (Odhiambo, 2009a).

The ARDL model used can be presented as follows.

$$\begin{aligned}\Delta HDI = \alpha_0 &+ \sum_{i=1}^{n} \alpha_{1i}\Delta HDI_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_{4i}\Delta CPI_{t-i} \\ &+ \sum_{i=0}^{n} \alpha_{5i}\Delta INFRAS_{t-i} + \sum_{i=0}^{n} \alpha_{6i}\Delta OPENNESS_{t-i} + \beta_1 HDI_{t-1} \\ &+ \beta_2 FDI_{t-1} + \beta_3 GDP_{t-1} + \beta_4 CPI_{t-1} + \beta_5 INFRAS_{t-1} \\ &+ \beta_3 OPENNESS_{t-1} + u_{it} \quad (1)\end{aligned}$$

The error correction model of the Model above can be specified as follows

$$\begin{aligned}\Delta HDI = \alpha_0 &+ \sum_{i=1}^{n} \alpha_{1i}\Delta HDI_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_{4i}\Delta CPI_{t-i} \\ &+ \sum_{i=0}^{n} \alpha_{5i}\Delta INFRAS_{t-i} + \sum_{i=0}^{n} \alpha_{6i}\Delta OPENNESS_{t-i} + \theta_1 ECM_{t-i} \\ &+ u_{1t} \quad (2)\end{aligned}$$

3.1.1 Unit Root Test

As mentioned above the Autoregressive Distributed Lag (ARDL) method does not require the

variables to be integrated at the same level. However, in order to identify if there is no variable integrated at order two, we will conduct the unit root test in order to avoid spurious results. The test will also help identify the suitability of the method chosen. We will use three different unit root tests in this paper to improve the validity of the integration of the variables. The Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1981), Dickey Fuller Generalised Least Squares (DF-GLS) (Elliot et al., 1996) and Phillips Perron PP (Phillips & Perron, 1988) unit Root tests on all our variables.

3.1.2 Bounds Test of Cointegration

After identifying the level of integration of the variables we tested the existence of long run relationship among the variables. We chose to use the bounds test of cointegration proposed by Pesaran et al. (2001) in this paper since we opted for the ARDL technique. This test allows us to identify the presence of long run relationship among the variables.

4. Empirical Findings

4.1 Results of Unit Root Tests

The results of the stationarity tests conducted with DF-GLS and PP unit root are presented in Tables 2 and 3. In Table 2 we observe that only FDI Inflow is stationary on levels of variables because the absolute values of DF-GLS and PP statistics are superior to the critical values. However, all the six variables became stationary after their first differences

Table 2. DF-GLS and PP unit root tests on level of variables

Variables	DFGLS test			Phillips Perron (PP)		
	SIC Lag	t-Stat	Critical value	SIC Lag	t-Stat	Critical value
FDI Inflows	0	-4.705	-3.77*	0	-4.55	-3.736*
HDI	0	-0.406	-3.421	0	0.801	-2.994
INFRAS	0	-1.371	-3.421	0	1.7	-2.994
CPI	0	-1.074	-3.421	0	1.587	-2.994
OPENNESS	0	-3.023	-3.421	0	-1.655	-2.994
GDP	0	-1.599	-3.421	0	-0.677	-2.994

(*), (**) and (***) denote statistical significance at the 1%, 5% and 10% levels respectively

Table 3. DF-GLS and PP unit root tests after their first difference

Variables	DFGLS test			Phillips Perron (PP)		
	SIC Lag	t-Stat	Critical value	SIC Lag	t-Stat	Critical value
HDI	0	-3.203	-3.096***	0	-2.944	-2.629***
INFRAS	0	-4.761	-3.77*	0	-3.991	-3.743*
CPI	0	-5.837	-3.77*	0	-4.863	-3.743*
OPENNESS	0	-5.864	-3.77*	0	-5.798	-3.743*
GDP	1	-3.865	-3.386***	0	-3.19	-2.997***

(*) and (**), (***) denote statistical significance at the 1%, 5% and 10% levels respectively

The results of the ADF tests are presented in table 4 and 5 of the annex of this paper and confirm the same results with the two previous tests. These results confirm the suitability of the ARDL method since the variables are integrated at different orders.

4.2 Results of Bound Test for Cointegration

The results of the bound test for cointegration are presented in Table 6 below. We used a maximum lag order of 2 for the conditional ARDL vector error correction model by using the Akaike information criteria (AIC).The F statistics of the model one is higher than the upper bound critical value at the 5 per cent level, the null hypothesis of no cointegration is then rejected for this model. We can conclude this section by saying that there is cointegration among the variables when HDI is used as a dependent variable

Table 6. Results of cointegration tests

Model	Dependent variables	Function		F statistics		Decision	
1	HDI	F (HDI|FDI Inflow, GDP, OPENNESS, INFRAS, CPI)		4.537		cointegration	
Critical value							
Pesaran et al. (2001:300)		10%		5%		1%	
critical values		I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
		2.26	3.35	2.62	3.79	3.41	4.68

4.3 Results of ARDL and ECM Estimation

The results from the bound test of cointegration helped us to identify the presence of long run and short run dynamics among the variables. We have used the ARDL estimation to evaluate the impact of the model F (HDI|FDI Inflow, GDP, OPENNESS, INFRAS, CPI) because there is cointegration among the variables when HDI and is used as a dependent variable. The results of the estimation are presented in Table 7

The optimal lag length for the estimation of our model is selected based on the Akaike Information Criteria (AIC). The optimal lag length selected for the model is lags (1 1 0 2 0 0).

In Table 7 we can see that though the coefficient of the variable FDI Inflows is negative in the short run and long run it is not statistically significant. FDI inflow has no significant impact on Human Development Index in the country. Though this result is not the one we were expecting we are not the first one who found this result. Gouhou et al (2012) also found similar results in their research between the relation between FDI Inflows and Human Development Index in Southern Africa. Three variables are significant in the model namely infrastructure, openness and CPI. The coefficient of the variable infrastructure is positive and significant which indicates that infrastructure contributes positively to the improvement of HDI of the country. However, the coefficients of the variables openness and CPI are negative which indicated that too much openness could be bad to the development of the country. This results also indicates

that CPI has a negative impact on HDI in long run.

The adjustment of the model is negative and significant which indicated that the errors of the previous period will be corrected in the current period. It also confirms the results of the bound test for cointegration we did. The regression for the underlying ARDL of model fits very well since the R square is 0.76 and the model is globally significant (0.0000) at 1% level

Table 7. Results of long run and short run estimation of the model

Regressor	Coefficient	t statistics	P-Value
Long run			
constant	.2227152	3.01	0.008
FDI Inflows	-.0002821	-0.05	0.961
CPI	-.0010303	-2.29	0.036
INFRAS	4.07e-13	3.89	0.001
GDP	-1.56e-13	-1.34	0.199
OPENNESS	-.0046935	-3.82	0.002
Short Run			
FDI Inflow	-.0015127	-1.63	0.122
OPENNESS	.0006221	2.15	0.047
_cons	.2227152	3.01	0.008
ADJUS	-.2659291	-2.88	0.011
Prob (F-statistic)	0.0000		
R square	0.7631		

4.4 Diagnostic Tests

We conduct the Durbin Watson Serial Correlation test, Breusch-Godfrey Serial Correlation test, White Heteroskedasticity test and the test of stability on the model and the model passed all the tests. The summary of the tests is presented in table 8 below. The plot for the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) is presented in the appendix of the paper. Our results indicate the absence of any instability of the coefficients because the plot of the CUSUMSQ statistic falls inside the critical bands.

Table 8. summary of the diagnostics tests

Tests	Probability
	Model F (HDI|FDI Inflows, GDP, OPENNESS, INFRAS, CPI)
Durbin Watson Serial Correlation test	1.822888
Breusch-Godfrey Serial Correlation test	0.5988
White Heteroskedasticity test	0.4076

5. Conclusion

According to Klein et al (2001), ‘‘Foreign Direct Investment remains one of the most effective tools to fight against poverty’’. Many economists share that view and some empirical studies found a positive impact of FDI on economic growth and poverty reduction. In order to contribute to the debate on the effectiveness of FDI, we chose to study the case of South Africa because of three reasons. Firstly, the country is the second largest recipient of the poorest region (Sub Saharan African region) in the world. The second reason is the scarcity of the study in the country. The third reason is that the only paper (Magombeyi & Odhiambo 2017) identified in the country found a mixed effect of FDI on poverty reduction due to different indicators of measure of poverty.

We used the times series data from 1990 to 2017 and the ARDL estimation technique in our study to evaluate the impact of FDI Inflows on HDI in the country. The results show that FDI Inflow has no significant impact on HDI both in the short run and long run. Our result is consistent with Gohou and Soumare (2012) who found that FDI has no significant impact on HDI in the Southern Africa region.

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Annexes

Table 4. ADF unit root tests on levels of variables

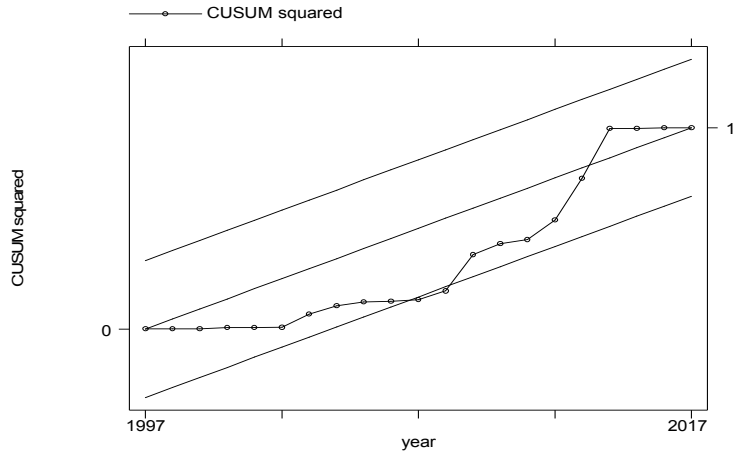
	With trend			With drift		
Variables	SIC Lag	t-Stat	Critical value	SIC Lag	t-Stat	Critical value
FDI Inflows	0	-4.544	-4.362*	0	-4.55	-2.485*
HDI	0	-0.078	-3.592	0	0.801	-1.708
INFRAS	0	-1.889	-3.596	0	1.138	-1.714
CPI	0	-0.567	-3.592	0	1.587	-1.708
OPENNESS	0	-2.855	-3.592	0	-1.655	-2.485
GDP	0	-1.572	-3.592	0	-0.677	-1.708

(*) and (**) (***) denote statistical significance at the 1%, 5% and 10% levels respectively

Table 5. ADF unit root tests on first difference of variables

	With trend			With drift		
Variables	SIC Lag	t-Stat	Critical value at 5%	SIC Lag	t-Stat	Critical value
HDI	0	-3.26	-3.238***	0	-2.944	-2.492***
INFRAS	0	-4.571	-4.371*	0	-3.991	-2.492
CPI	0	-5.627	-4.371*	0	-4.863	-2.492*
OPENNESS	0	-5.787	-4.371*	0	-5.798	-2.492*
GDP	1	-3.623	-3.6**	1	-3.736	-2.508**

(*) and (**) (***) denote statistical significance at the 1%, 5% and 10% levels respectively



Plot of Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ)