Foreign direct investment and economic growth nexus in Zimbabwe: A cointegration approach

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Abstract

This paper seeks to examine the relationship between foreign direct investment and economic growth in Zimbabwe by applying an Autoregressive Distributed Lag (ARDL) cointegration approach on time series data stretching from 1975 to 2007. The short-and long-run relationship results show that foreign direct investment has a positive effect on economic growth and this confirms the proposition of economic theory and the result findings of the previous studies in this area. According to the study, the results imply that economic and investment policies which can attract more foreign investments be effectively drafted so as to stimulate economic growth. This also involves creating a stable economic and investment environment, improving infrastructure, and ensuring clarity and consistency of investment policies.

Key Words: Economic Growth, Foreign Direct Investment, Cointegration, Autoregressive Distributed Lag (ARDL), Zimbabwe

1. Introduction

For decades, foreign direct investment (FDI) has often been claimed to play a vital part in the connection between economic growth and globalization. This has seen many countries including developing ones positively embracing this international FDI network. Experts argue that FDI brings scarce capital and technology, management and entrepreneurship skills from rich to poor countries which in the long run will accelerate growth of the host country. In the developing world, it is often contended that the possibilities appear endless (Mody, 2007, p.2).

Foreign direct investment (FDI) is defined as a set of investments in which a resident enterprise in one country establishes a long-term interest in another enterprise outside its country borders (OECD, 2008, p.17). Many scholars have conducted research on its effect on various economies and many of them have confirmed a positive effect on various economic indicators such as national output, employment, among others. These scholars include the likes of Zhang (2001), Barua (2013), Choe (2003), (Dunning, 1993), and (de Mello, 1996). In their research, they argue that foreign capital inflow supplements the supply of funds and resources for investment, consequently, stimulating capital formation in the recipient economy. They also further note that FDI provides a lot of desirable recipes for growth to an economy such as cheaper facilities of production and manufacturing, new foreign markets and advanced marketing networks, advanced skills, technology and machinery. In the same vein, other studies also argue that provided a very conducive environment, FDI can establish long-term links between economies, which are strong impetus for economic growth and development (Ghoshal and Saxena, 2012, p.561).

However, taking a closer look at this long-time debated relationship between foreign direct investment and economic growth, from an African economy's or a developing country's perspective, this claimed positive relationship can be very questionable. This is so because a lot of developing countries, instead of enjoying the benefits of FDI, they have been left at the mercy of its disastrous effects. Developing countries like for example, Somalia can be a case study of such catastrophic effects of FDI, as they have been left worse off (Manzolillo *et al.*, 2000). These economies despite having high FDI levels, they have been characterized by low levels of economic growth, high rates of unemployment, poverty, and high mortality rates.

Some firm-level studies, for example; a study by Durham (2004) confirms this negative relationship between FDI and economic growth.

In light of the above alluded to controversy over the FDI-economic growth nexus and also as the main purpose of this study, it is very imperative to empirically examine the nature relationship between these two variables in Zimbabwe, and derive policy implications and recommendations based on the findings of the research that maybe useful for policy-makers.

Currently, the Zimbabwean economy is in a crisis. Key sectors of the economy such as the financial, agricultural and manufacturing sectors are in a near-comatose state due to lack of capital, persistent droughts and negative economic environment. This has bred hunger and starvation to more than 50% of the Zimbabwean citizens (World Health Organization, 2015). Banks, industries and companies are closing down and excessively retrenching workers in the process. With these current waves of retrenchments, tax collection authorities have realized lower revenues, and this has continued to shrink the economy further. Intensive brain drain, demonstrations and other devastating socio-economic vagaries have also set in, as the citizens try to eke a living. As a solution to mitigate these problems, the government is proposing to inject large sums of money into the economy. Unfortunately, on its own it cannot, due to the fact that it is technically insolvent. That is why it is advocating for the idea of sourcing for foreign direct investment (Reserve Bank of Zimbabwe Statement, 2016). But, before undertaking such an investment policy stance, it is crucial to first evaluate the significance of such a policy to see if it can achieve the desired goals, otherwise it will be a complete waste of time. Thus, the study will assist policy makers decide what to do next as far as the adoption of this foreign direct investment policy is concerned.

Research on the relationship between FDI and economic growth has mostly been confined to developed countries, Asia, Northern and Western Africa. Studies from some of these countries include those by Zhang (2001), Choe (2003), Jacob *et al.,* (2012) among others. Not much research has been done on this area in Southern Africa, in particular, Zimbabwe. In addition to the efforts made by these previous scholars, this study makes the following remarkable contributions: Firstly, the study presents a unique developing and/ African country, Zimbabwe, a country arrested by unevenness inequality, weak political systems, low levels of economic freedom, poverty and underdevelopment (Zimbabwe National Budget Statement, 2011). Moreover, what makes Zimbabwe a significant country to be under

analysis, is that it has and is still experiencing various political and economic problems (Sikwila, 2013). Zimbabwe is a small landlocked economy that has been heavily economically sanctioned by the Western countries a couple of years back, and that has encountered extreme waves of hyperinflationary periods in the past decade (Elich, 2002). This makes this study different from all previous studies which concentrated on economies which are not landlocked, with stable inflation rates and sound economic activity. That is, this study is quite relevant since it gives another picture of how FDI effect changes in an economy that is totally plagued with different economy threatening factors.

Secondly, this study is different from all previous studies like for example, the study of Moyo (2013) which have tried to examine this relationship in Zimbabwe because it covers all significant periods which the economy has transversed, that is; the Pre-Independence Period (before 1980 independence), the Post-Independence period (1980-2006), the Hyperinflationary Period (2007-2008) and the Dollarization Period (2009 going forth).

Thirdly, the estimation methodology invoked in this study differs from many similar studies in the literature. Most of the previous research on this area for example by Saqib *et al.,* (2013) and Balasubramanyam *et al.,* (1996) employed the OLS approach. They assumed a linear relationship between the variables. In contrast, this study runs a cointegration analysis. Employing such an analysis not only shows the nature of the relationship between FDI and growth, but it also helps to capture the short-and long-run relationship between these variables; this will provide a more real insight of the economy and more efficient model estimates than previous studies. In Zimbabwe, no other study has ever used this approach in determining the relationship between these variables. Finally, the study will aid the Zimbabwean policy makers and government on investment and growth policy issues.

This paper is organized into six sections. Following the introductory part, Section 2 provides the empirical literature review. Section 3 gives a brief overview of the FDI performance in the economy. Section 4 presents the methodology and describes the data set. The results are discussed in Section 5. Finally, Section 6 concludes the study.

2. Literature Review

The FDI-growth nexus has attracted a lot of empirical research on many economies over the years. Highlighted below, are some of the studies that provide excellent surveys of recent results in this literature.

Using cointegration approach, Granger causality test and Error Correction Model (ECM), Zhang (2001) carried out a causality test between FDI and economic growth in nineteen countries of Latin America and South-East Asia. In five countries in Latin America and one country in South East Asia, a unidirectional causality running from FDI to economic growth was found. A bi-directional short-run causal link between economic growth and FDI was found in two countries from Latin America and five from East and South East Asia. Among the many benefits of FDI, Zhang discovered that technology transfer and spill-over efficiency are some of the major benefits of FDI to recipient economies. He also emphasized that this benefit is not an automatic process but depends on the recipient economies' absorptive capabilities, which comprise of a sound liberal trade policy, an average to high human capital development state, and a favourable export-oriented FDI policy.

In Nigeria, Jacob *et al.,* (2012) tested the causality relationship between FDI and economic growth between the year 1970 and 2008. Single and simultaneous equation systems were employed. According to the results, a positive bi-directional relationship was found running from FDI to economic growth and from economic growth to FDI.

Employing cross-sectional data and the ordinary least squares (OLS) approach, between the year 1990 and 1995, Balasubramanyam *et al.,* (1996) examined how FDI explains changes in developing countries' level of economic growth. A positive and significant FDI coefficient was found only on economies that possess an export promotion strategy.

Based on Barua (2013)'s study in India between the year 2000 and 2012 examining the dynamics of cointegration between FDI, economic growth and exports, the results suggest that FDI, economic growth and exports are positively correlated. Applying Granger causality test and using a sample of 80 countries for the period between 1971 and 1995, Choe (2003) found a bi-directional causal relationship between these two variables, FDI affecting economic growth more.

Hsu and Wu (2008) carried out a study to verify if the impact of FDI on an economy's level of economic growth is truly dependent upon absorption capabilities (initial GDP, human capital and the volume of trade). A sample period of between 1975 and 2000 was covered. Based on a sample of 62 countries and using threshold regression, FDI was found to have a positive and significant impact on growth when host countries have better levels of initial GDP and human capital.

However, not all empirical evidence supports the proposition that FDI has a positive influence of economic growth. Durham (2004), based on his study findings, failed to find a positive relationship between the two variables. Employing both panel and time series data from a sample of 32 developed and developing countries, De Mello (1999) also found weak indications of the causal relationship between the two variables.

Saqib *et al.,* (2013), carried out a study examining the impact of foreign direct investment on Pakistan`s economy between 1981 and 2010. Using OLS model, four more variables were also invoked into the model and these included trade, inflation, domestic investment and debt. The results findings show that FDI negatively affects Pakistan's economic growth, while domestic investment variable proved to be statistically significant in explaining the positive changes in economic growth. The rest of the variables proved to have a negative effect on economic growth.

Summary of Empirical Results on FDI and Economic Growth Relationship

AUTHOR(S)	DATA	COUNTRY	METHOD	RESULTS
Zhang (2001)	Panel and Time Series	19 countries of Latin America and South-East Asia	Cointegration Approach, Granger Causality, ECM	A bi-directional short-run causal link between economic growth and FDI was found
Jacob *et al.,* (2012)	Time Series	Nigeria (1970-2008)	Single and simultaneous equation systems	A positive bi-directional relationship was found between economic growth and FDI
Balasubramanyam *et al.,* (1996)	Cross-Sectional	46 developing countries (1990-1995)	Ordinary Least Squares Approach	FDI has a positive and significant effect on economic growth
Barua (2013)	Time Series	India (2000-2012)	Cointegration Approach	FDI, economic growth and exports are positively correlated

Choe (2003)	Panel and Time Series	80 countries (1971-1995)	VAR ,Granger Causality	A bi-directional causal relationship between the two variables was found, FDI affecting economic growth more.
Hsu and Wu (2008)	Cross-sectional	62 countries (1975-2000)	Threshold Regression	FDI has a positive and significant impact on economic growth
Durham (2004)	Time Series	80 countries (1979-1998	Cointegration Approach	Failed to find a positive relationship between the two variables
De Mello (1999)	Panel and Time Series	32 developed and developing countries (1970-1990)	Vector Autoregressive Approach (VAR)	Found weak indications of the causal relationship between the two variables
Saqib *et al.,* (2013)	Time Series	Pakistan (1981-2010)	Ordinary Least Squares Approach	FDI negatively affects Pakistan's economic growth

Taking these opposing findings into account, it can be inferred that the FDI-economic growth relationship is not by definition positive as postulated by the economic theory of the endogenous models, but is rather relative and subjective. That is, the positive influence of FDI on economic growth should not be overgeneralised on every economy since the relationship between these two variables is not homogenous, but rather heterogeneous across countries (Djurovic, 2012, p.4). The next section looks at the foreign direct investment in the Zimbabwean economy.

3. Foreign Direct Investment in Zimbabwe

Zimbabwe is one of the few countries in Africa which have very favourable investment conditions. There are highly skilled and literate citizens, better infrastructure, a highly diversified economy, and better access to major regional markets such as the Southern Africa Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA). Furthermore, the Zimbabwean economy is using the US-dollar, thus minimizing exchange risks.

The promotion and facilitation of both FDI and domestic investment is manned by the Zimbabwe Investment Authority (ZIA). To date, most of the foreign investors have been coming from South Africa, China and Mauritius, investing in agriculture, manufacturing, and mining sectors (Zimbabwe Investment Climate Statement, 2015).

The diagram below depicts the FDI trend since the year 1970. For better analysis, the time period is split into four distinct phases.

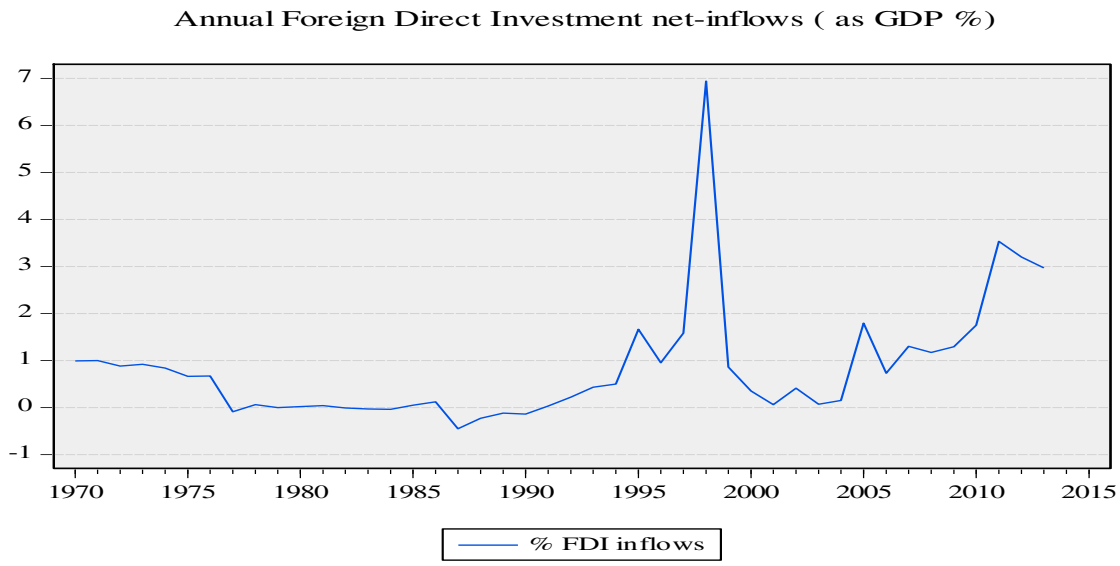

Figure 1: Foreign Direct Investment net-inflows from the year 1970 to 2015

Source: Author's compilation based on figures from World Bank (2016),

(i) 1970s Phase

This phase was characterized by the independence war and imposition of sanctions on the country (Kurebwa, 2012). This saw FDI dropping dramatically to about -0,1% by the year 1977.

(ii) 1980-1998 Phase

The 1980 independence gave birth to an increase in FDI growth, reaching a peak of approximately 7% in the year 1998. The newly elected government after independence adopted a highly controlled and inward looking economy that heavily depended on FDI (70%) on the promotion of economic growth (Clarke, 1980). A lot of incentives such as, tax holidays and tariff exemptions were offered to encourage foreign capital investments, technological transfer, utilization of local raw materials, and the use of labour intensive production techniques. Furthermore, the previously imposed economic sanctions which had been haunting the economy during the 1970s were latter uplifted, better fiscal policies started being embraced in the economy, and also external markets began to open up (IMF, 1998). All these positive strides which occurred triggered the FDI performance during the period.

(iii) 1999-2008 Phase

This phase was composed of economic mismanagement, capital flight, poor land reform practices, loss of support from the international community, low levels of domestic and foreign direct investment, and hyperinflation. The inflation rate increased exponentially, reaching triple figures by the end 2006. It was even fuelled further by the increase of money supply into the economy by the Central Bank. The cumulative occurrence of droughts since 2002 did not only entrench rural poverty but also forced a lot of investors who had put funds in the agricultural sector to pool out (Nangombe, 2014). This explains the decrease in FDI during the phase as highlighted on the above figure.

The situation was further aggravated by the imposition of economic sanctions against country, which later precipitated negative perceptions about nation, making it extremely complex for the private and public enterprises to secure funding. Between the period 1980 to 1999, Zimbabwe enjoyed vast amounts of financial assistance from international institutions such as the AfDB, IMF and World Bank, but by 2001 all these institutions had pulled back their support on Zimbabwe. For example, IMF stopped supporting Zimbabwe by way of BoP support in 1999, the World Bank in 2001, and AfDB in 1998. During this period, Zimbabwe was classified as a very risky investment area, and this saw FDI declining (Reserve Bank of Zimbabwe Bulletin, 2006).

(iv) 2009 going forth Phase

This is generally referred to as the dollarization era. Beginning of 2009, the Zimbabwean government adopted the dollarization regime to cool down the economy from the effects of the hyperinflation that had melted the whole economy. This saw some positive changes in the economy; the inflation level decreased to a single digit figure ranging between 3.1% and 3.5% between the year 2010 and 2012. Furthermore, the severe economic problems which had hampered FDI inflows from US$103 million in 2005 to US$40 million in 2006 came to a halt and this revamped the investment confidence level; net FDI rose from US$44 million in 2008 to US$90 million in 2010 (ZimStat, 2013).

However, despite the positive strides which have been achieved since the initiation of the dollarization regime, Zimbabwe is still regarded risky as far as investment is concerned. The next section specifies the methodology.

4. Methodology

In this study, the FDI-economic growth nexus is examined. Time series data on all the variables is collected from the World Bank Statistics, Reserve Bank of Zimbabwe Reports and International Monetary Fund. All variables are at their end period rates and are all in yearly frequencies. The data set stretches from the year 1975 to 2007, giving a total of 33 observations. *E-views 9* is employed to estimate the model. Equation (1) is estimated to test the FDI-economic growth nexus.

$$lnRGDP_t = \beta_0 + \beta_1 lnFDI_t + \beta_2 lnTROP_t + \beta_3 lnGSP_t + \beta_4 lnAGRIC_t + \mu_t \qquad (1)$$

Variable	Description
RGDP	Economic Growth variable measured by Real GDP per-capita
FDI	Foreign Direct Investment variable measured as a percentage of GDP
β_0	Constant
$\beta_1 \ldots . \beta_4$	Coefficients to be estimated
TROP	Trade Openness variable measured as a percentage of GDP
GSP	Government Spending variable measured as a percentage of GDP
AGRIC	Agricultural Productivity variable measured as a percentage of GDP
μ_t	Error term
ln	Natural Logarithm

The examination of the relationships among the above series expressed in Equation (1) is exposed by carrying out a cointegration analysis. However, before running this analysis, one of the tests carried out in this study is the Stationarity test. This test is very vital because carrying out any econometric analysis with non-stationary series can breed the problem of spurious regression. The Augmented Dickey Fuller test is employed to test for stationarity and is expressed as follows:

$$\Delta lnRGDP_t = \varphi_0 + \varphi_1 lnRGDP_{t-1} + \theta t + \sum \varphi_2 \Delta lnRGDP_{t-i} + \mu_t \qquad (2)$$

Where the lagged difference term of the series, $\sum \varphi_2 \Delta lnRGDP_{t-i}$ takes care of possible autocorrelation in the residuals. The φ_0 and θt represent the deterministic and the trend in the data generating processes. The number of augmented lags is determined by minimizing the Schwartz Bayesian Information. Alternatively, the lag is determined by the starting at sufficiently large enough lags and dropping until the last lag is statistically significant. The ADF is left-skewed and hence the hypothesis

$$\boldsymbol{H_0}: \varphi_1 = 0 \ (unit\ root) \qquad \boldsymbol{H_0}: \varphi_1 < 0 \ (stationary)$$

Once a series is found to have a unit root in the levels, it is made stationary by differencing. However, to establish the correct data generating process, the H_o is constructed under three null hypotheses: (1) with drift and deterministic trend as shown above, (2) with only drift, or (3) without drift and deterministic trend.

Following the stationarity test, cointegration analysis is run to make sure that the series are not cointegrated, that is, whether or not there is any long-term relationship among them. This analysis is based on the assumption that long-run structure of non-stationary series can be stationary (Gujarati and Porter, 2009).

To test for cointegration, an Autoregressive Distributed Lag (ARDL) approach developed by Peseran *et al.,* (2001) is applied. This approach has received greater emphasis since a couple of years back due to its ability to return both short-run and long-run multipliers, and its ability to estimate both I(0) and I(1) series in the same model. Furthermore, it is simple to implement and interpret since it only involves just a single-equation set-up. Lastly, different variables can be assigned different lag-lengths as they enter the model (Pesaran *et al*., 2001). For these reasons, this approach is adopted in this study.

The ARDL cointegration test developed consists of two significant stages, in which during the first stage, the presence of a long-run relationship among the series is examined. Once it is detected, the second stage examines the structure of the short and long run relationships. In summary, to carry out this procedure, the computed F-statistics are compared to the critical lower and upper bound values. The decision rule is that if the F-statistic exceed the critical upper bound value, then the null hypothesis of no cointegration is rejected; if the F-statistic is below the critical lower bound value, then the null hypothesis of no cointegration is accepted; but if the F-statistic falls between the critical lower and upper values, then knowledge of the order of integration is required or else it is inconclusive (Pesaran *et al.*, 2001). The following section looks at the empirical results.

5. Empirical Results

Results on stationarity, cointegration, short-and long-run relationships of the series are presented and interpreted in this section.

5.1 Stationarity Results

Table 1: Augmented Dickey-Fuller Unit Root Test

Variable	ADF Statistic	Critical Values	Order of Integration
Economic Growth **[lnRGDP]**	-3.422460***	1% -2.641672 5% -1.952066 10% -1.610400	I(1)
Foreign Direct Investment **[lnFDI]**	-4.857228***	1% -3.670170 5% -2.963972 10% -2.621007	I(1)
Trade Openness **[lnTROP]**	-5.423135***	1% -3.661661 5% -2.960411 10% -2.619160	I(1)
Government Spending **[lnGSP]**	-4.208874***	1% -3.661661 5% -2.960411 10% -2.619160	I(1)
Agricultural Productivity **[lnAGRIC]**	-4.002458***	1% -3.653730 5% -2.957110 10% -2.617434	I(0)

Source: Eviews 9
*Notes: i) ******* denotes the significance at 1%, 5% and 10%, level*

From the results above, it is shown that Economic Growth, Foreign Direct Investment, Trade Openness, and Government Spending variables are all stationery after differencing I(1). Agricultural Productivity variable is stationary at level I(0). Based on these results, cointegration analysis is very paramount.

5.2 Cointegration Analysis

Since the stationarity of these series is different that is, I(1) and I(0), an ARDL test is employed to detect the presence of cointegration among them. Bounds test results are tabled below:

Table 2: Limit Test

k	F-statistic	Lower Limit*	Upper Limit*
4	4.982869	2.56	3.49

**Peseran et al., (2001): Critical values were selected for a significance level of 5%.*

Based on the above results, it can be seen that there is cointegration among the series, that is, there is long-run relationship among the series. This is evidenced by the F-statistic value (4.98) which exceeds the upper bound limit (3.49). Therefore, short-run and long-run relationships of the series can be carried out.

5.2.1 Long-Run Relationship

To select the appropriate lag lengths for the model, Schwarz criterion is applied, and the most suitable ARDL model selected is a model with the following lags (2, 1, 0, 1, 0). It is also worthy to note that this model passes all diagnostics tests such as stability, normality, heteroskedasticity, serial autocorrelation among others. The table below shows the long-run relationship results obtained from this model.

Table 3: Results of long-run relationships

Variables	Coefficient	t-Statistic	Prob-Value
lnFDI	0.233763	4.470106	0.0002
lnTROP	0.004463	0.064442	0.9492
lnGSP	0.165985	1.667757	0.1095
lnAGRIC	0.233326	2.139814	0.0437

Based on these results, it can be concluded that Foreign Direct Investment (lnFDI) and Agricultural Productivity (lnAGRIC) have a positive and significant long-run relationship with economic growth. This is shown by their p-values of less than 0.05, t-statistics of greater than 2 and positive coefficients. The remaining variables although having a positive effect on economic growth as explained by their coefficients, they are statistically insignificant.

5.2.2 Short-Run Relationship

The following table displays the short-run relationships that exist among the series.

Table 4: Results of Short-Run Relationships

Variables	Coefficient	t-Statistic	Prob-Value
ECM(-1)	-0.420471	-5.099197	0.0000
D(lnRGDP(-1))	0.457750	3.665741	0.0014
D(lnFDI)	0.041153	2.017487	0.0560
D(lnTROP)	-0.025783	-0.350142	0.7296
D(lnGSP)	-0.032191	-1.232320	0.2308
D(lnAGRIC)	0.115624	3.726661	0.0012

According to the results displayed above, it can be established that there is a short-run relationship among the series and this is evidenced by a negative and statistically significant ECM coefficient, which is also called the adjustment coefficient. Regardless of foreign direct investment (FDI) variable being statistically insignificant as evidenced by a p-value of greater than 0.05, it has a positive effect on economic growth. Agricultural Productivity (lnAGRIC) has a positive and significant short-run relationship with economic growth while Government Spending (lnGSP) and Trade Openness (lnTROP) variables have a negative and statistically insignificant effect in the short-run.

6. Conclusion

In this study, time series data stretching from 1975 to 2007 is used in order to examine the relationship between foreign direct investment and economic growth in Zimbabwe by employing an ARDL cointegration analysis. Cointegration is first detected using bounds test, then afterwards, short-and long run relationships among the series are also exposed. The long-run relationship results show that foreign direct investment has a positive and statistically significant relationship with economic growth. This positivity conforms to economic theory and also tallies with results of many scholars in this area like of Balasubramanyam *et al.*, (1996), Barua (2013), and Hsu and Wu (2008) among others. Based on the result findings, both in the short-and long-run, it is seen that foreign direct investment has a positive effect on economic growth in Zimbabwe, and a major implication of this study is that policy makers must continue to devise policies that create a conducive environment to attract more foreign direct investments in order to increase economic growth. The policy makers may for example, craft a long-term plan for fiscal stability in order to create a stable economic and investment environment, increase public investment in basic research and development, ensure an adequate supply of skilled workers by providing workforce training, and modernise infrastructure. Lastly, there should be clarity and consistency of investment policies in order to create a policy framework for investment that engenders confidence and boosts economic activity.

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APPENDIX A: DATA SET

	Economic Growth	Foreign Direct Investment	Trade Openness	Government Spending	Agricultural Productivity
YEAR	**lnRGDP**	**lnFDI**	**lnTROP**	**lnGSP**	**lnAGRIC**
1975	2.841931	1.373509	1.675503	1.081184	1.280030
1976	2.829842	1.207119	1.619824	1.141671	1.279397
1977	2.785109	1.235167	1.618153	1.213575	1.258024
1978	2.759152	1.029188	1.623973	1.254252	1.157020
1979	2.758526	1.057272	1.647383	1.252956	1.133297
1980	2.801385	1.228836	1.697665	1.267443	1.195820
1981	2.836100	1.318395	1.657438	1.209366	1.248870
1982	2.830272	1.279980	1.593618	1.269357	1.207358
1983	2.819747	1.155493	1.555699	1.237869	1.050678
1984	2.794204	1.231355	1.617210	1.301902	1.171968
1985	2.806665	1.250907	1.644931	1.305425	1.355520
1986	2.799513	1.256630	1.659536	1.314878	1.249462
1987	2.788866	1.174239	1.655619	1.368577	1.158589
1988	2.805662	1.271882	1.645127	1.439129	1.214371
1989	2.813892	1.177190	1.653116	1.271619	1.174069
1990	2.830630	1.239973	1.659631	1.288833	1.216860
1991	2.842638	1.281111	1.707911	1.207358	1.183761
1992	2.791369	1.306152	1.804139	1.383062	0.870040
1993	2.786678	1.357456	1.801129	1.174556	1.177216
1994	2.816624	1.375280	1.851992	1.222555	1.278145
1995	2.809571	1.293588	1.898615	1.255585	1.182848
1996	2.845214	1.268155	1.857634	1.228909	1.337881
1997	2.850091	1.258491	1.915400	1.212589	1.277244
1998	2.856475	1.317028	1.947385	1.198218	1.338228
1999	2.847709	1.158250	1.851197	1.250198	1.282773
2000	2.829817	1.132561	1.869173	1.384986	1.261539
2001	2.832426	1.011421	1.831550	1.247794	1.238223
2002	2.788970	0.698970	1.825296	1.253423	1.147027
2003	2.705252	0.903090	1.848251	1.253247	1.219935
2004	2.676096	0.654091	1.880242	1.322232	1.291703
2005	2.646639	0.183320	1.881042	1.182166	1.268982
2006	2.626565	0.196221	1.918555	0.769574	1.307107
2007	2.604819	0.851855	1.924899	0.506258	1.334412

APPENDIX B: UNIT ROOT TEST RESULTS

a) Variable lnRGDP (Economic Growth)

Null Hypothesis: D(LNRGDP) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.422460	0.0013
Test critical values:	1% level	-2.641672	
	5% level	-1.952066	
	10% level	-1.610400	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNRGDP,2)
Method: Least Squares
Date: 11/24/16 Time: 15:05
Sample (adjusted): 1977 2007
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	-0.568304	0.166051	-3.422460	0.0018

R-squared	0.280726	Mean dependent var	-0.000312
Adjusted R-squared	0.280726	S.D. dependent var	0.030400
S.E. of regression	0.025782	Akaike info criterion	-4.446526
Sum squared resid	0.019942	Schwarz criterion	-4.400268
Log likelihood	69.92115	Hannan-Quinn criter.	-4.431447
Durbin-Watson stat	1.905188		

b) Variable lnFDI (Foreign Direct Investment)

Null Hypothesis: D(LNFDI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.857228	0.0005
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFDI,2)
Method: Least Squares
Date: 11/24/16 Time: 14:48
Sample (adjusted): 1978 2007
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFDI(-1))	-1.606463	0.330737	-4.857228	0.0000
D(LNFDI(-1),2)	0.598886	0.227082	2.637311	0.0137
C	-0.036792	0.034151	-1.077334	0.2909

R-squared	0.481984	Mean dependent var	0.020920
Adjusted R-squared	0.443612	S.D. dependent var	0.234340
S.E. of regression	0.174797	Akaike info criterion	-0.555739
Sum squared resid	0.824961	Schwarz criterion	-0.415620
Log likelihood	11.33609	Hannan-Quinn criter.	-0.510914
F-statistic	12.56095	Durbin-Watson stat	1.675156
Prob(F-statistic)	0.000139		

c) Variable lnTROP (Trade Openness)

Null Hypothesis: D(LNTROP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.423135	0.0001
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNTROP,2)
Method: Least Squares
Date: 11/24/16 Time: 14:50
Sample (adjusted): 1977 2007
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNTROP(-1))	-0.966009	0.178127	-5.423135	0.0000
C	0.009575	0.007484	1.279294	0.2109

R-squared	0.503513	Mean dependent var	0.002001
Adjusted R-squared	0.486393	S.D. dependent var	0.057124
S.E. of regression	0.040939	Akaike info criterion	-3.491124
Sum squared resid	0.048604	Schwarz criterion	-3.398609
Log likelihood	56.11243	Hannan-Quinn criter.	-3.460967
F-statistic	29.41039	Durbin-Watson stat	2.015017
Prob(F-statistic)	0.000008		

d) Variable lnGSP (Government Spending)

Null Hypothesis: D(LNGSP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.208874	0.0025
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGSP,2)
Method: Least Squares
Date: 11/24/16 Time: 14:51
Sample (adjusted): 1977 2007
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGSP(-1))	-0.826517	0.196375	-4.208874	0.0002
C	-0.018753	0.021713	-0.863713	0.3948

R-squared	0.379209	Mean dependent var	-0.010445
Adjusted R-squared	0.357803	S.D. dependent var	0.150229
S.E. of regression	0.120390	Akaike info criterion	-1.333828
Sum squared resid	0.420316	Schwarz criterion	-1.241312
Log likelihood	22.67433	Hannan-Quinn criter.	-1.303670
F-statistic	17.71462	Durbin-Watson stat	1.980835
Prob(F-statistic)	0.000226		

e) Variable lnAGRIC (Agricultural Productivity)

Null Hypothesis: LNAGRIC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.002458	0.0042
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNAGRIC)
Method: Least Squares
Date: 11/24/16 Time: 14:54
Sample (adjusted): 1976 2007
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAGRIC(-1)	-0.713617	0.178295	-4.002458	0.0004
C	0.871732	0.217981	3.999120	0.0004

R-squared	0.348105	Mean dependent var	0.001699
Adjusted R-squared	0.326375	S.D. dependent var	0.111982
S.E. of regression	0.091909	Akaike info criterion	-1.875573
Sum squared resid	0.253418	Schwarz criterion	-1.783965
Log likelihood	32.00917	Hannan-Quinn criter.	-1.845207
F-statistic	16.01967	Durbin-Watson stat	1.888795
Prob(F-statistic)	0.000379		

APPENDIX C: ARDL Bounds Test

ARDL Bounds Test
Date: 11/24/16 Time: 15:13
Sample: 1977 2007
Included observations: 31
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.982869	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Test Equation:
Dependent Variable: D(LNRGDP)
Method: Least Squares
Date: 11/24/16 Time: 15:13
Sample: 1977 2007
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	0.376720	0.194834	1.933539	0.0661
D(LNFDI)	0.063357	0.029802	2.125920	0.0450
D(LNGSP)	-0.049557	0.046454	-1.066804	0.2976
C	1.083588	0.351750	3.080566	0.0055
LNFDI(-1)	0.119971	0.027654	4.338281	0.0003
LNTROP(-1)	0.042463	0.035915	1.182305	0.2497
LNGSP(-1)	0.088138	0.055088	1.599952	0.1239
LNAGRIC(-1)	0.026120	0.055006	0.474864	0.6396
LNRGDP(-1)	-0.514738	0.135745	-3.791941	0.0010

R-squared	0.638899	Mean dependent var	-0.007259
Adjusted R-squared	0.507589	S.D. dependent var	0.027569
S.E. of regression	0.019346	Akaike info criterion	-4.814999
Sum squared resid	0.008234	Schwarz criterion	-4.398680
Log likelihood	83.63248	Hannan-Quinn criter.	-4.679289
F-statistic	4.865588	Durbin-Watson stat	2.176083
Prob(F-statistic)	0.001491		

APPENDIX D: LONG RUN AND SHORT RUN RELATIONSHIP

ARDL Cointegrating And Long Run Form
Original dep. variable: LNRGDP
Selected Model: ARDL(2, 1, 0, 1, 0)
Date: 11/24/16 Time: 15:15
Sample: 1975 2007
Included observations: 31

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	0.457750	0.124872	3.665741	0.0014
D(LNFDI)	0.041153	0.020398	2.017487	0.0560
D(LNTROP)	-0.025783	0.073637	-0.350142	0.7296
D(LNGSP)	-0.032191	0.026122	-1.232320	0.2308
D(LNAGRIC)	0.115624	0.031026	3.726661	0.0012
CointEq(-1)	-0.420471	0.082458	-5.099197	0.0000

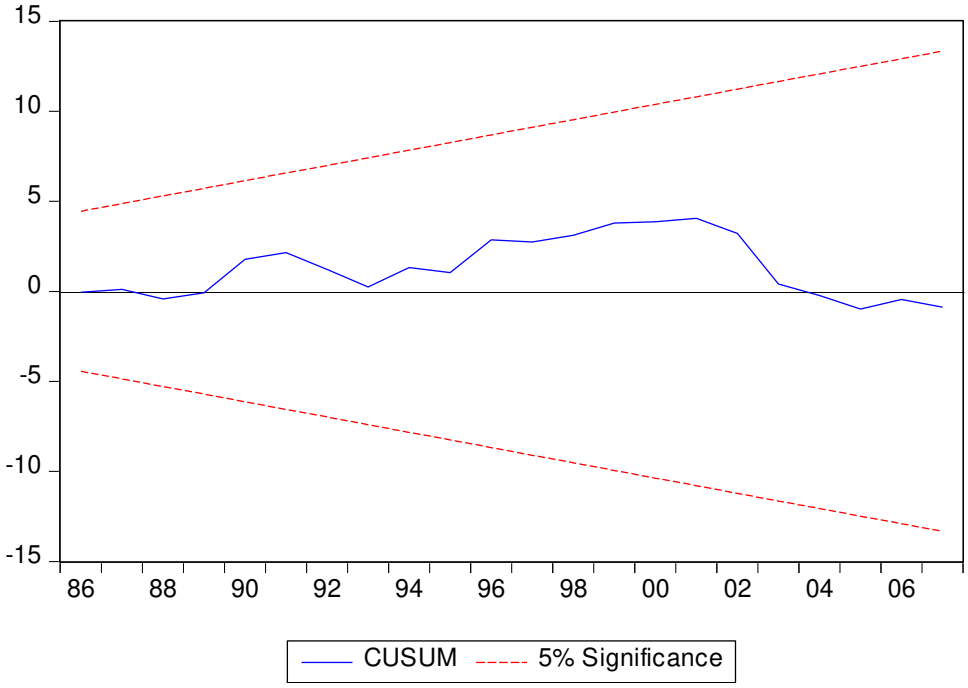
Cointeq = LNRGDP - (0.2338*LNFDI + 0.0045*LNTROP + 0.1660*LNGSP + 0.2333*LNAGRIC + 2.0244)

Long Run Coefficients

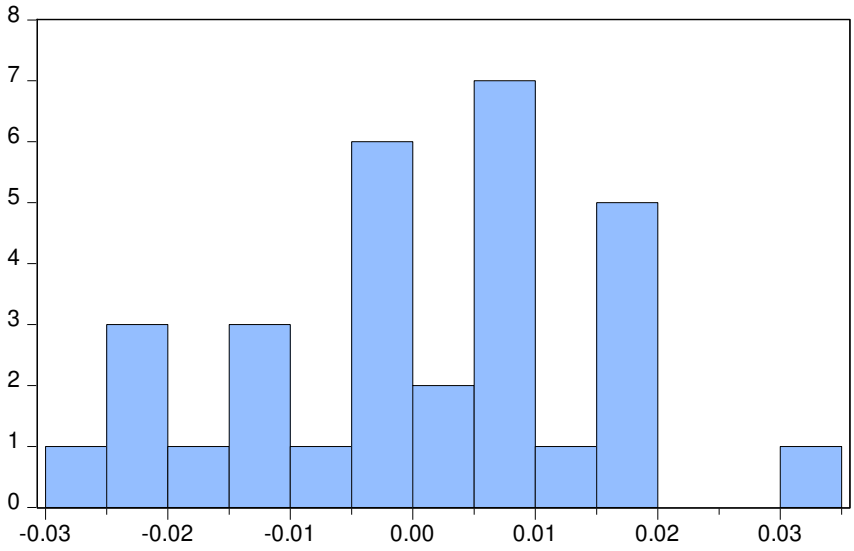
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	0.233763	0.052295	4.470106	0.0002
LNTROP	0.004463	0.069262	0.064442	0.9492
LNGSP	0.165985	0.099526	1.667757	0.1095
LNAGRIC	0.233326	0.109040	2.139814	0.0437
C	2.024356	0.233173	8.681770	0.0000

APPENDIX E: DIAGNOSTIC TESTS

a) Stability Test



b) Normality Test



Series: Residuals	
Sample 1977 2007	
Observations 31	
Mean	1.07e-15
Median	0.001089
Maximum	0.032582
Minimum	-0.028934
Std. Dev.	0.014572
Skewness	-0.133533
Kurtosis	2.546594
Jarque-Bera	0.357663
Probability	0.836247

c) Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.124613	Prob. F(2,20)	0.8835
Obs*R-squared	0.381546	Prob. Chi-Square(2)	0.8263

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 11/26/16 Time: 19:57
Sample: 1977 2007
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP(-1)	0.064552	0.203625	0.317014	0.7545
LNRGDP(-2)	-0.043087	0.178471	-0.241422	0.8117
LNFDI	0.002754	0.023459	0.117397	0.9077
LNFDI(-1)	-0.008141	0.036704	-0.221802	0.8267
LNTROP	0.001604	0.032665	0.049093	0.9613
LNGSP	-0.000588	0.041334	-0.014219	0.9888
LNGSP(-1)	0.004898	0.047465	0.103189	0.9188
LNAGRIC	-0.003056	0.039243	-0.077885	0.9387
C	-0.058115	0.364844	-0.159287	0.8750
RESID(-1)	-0.154415	0.310073	-0.497995	0.6239
RESID(-2)	-0.011467	0.248347	-0.046174	0.9636

R-squared	0.012308	Mean dependent var	1.07E-15
Adjusted R-squared	-0.481538	S.D. dependent var	0.014572
S.E. of regression	0.017737	Akaike info criterion	-4.954880
Sum squared resid	0.006292	Schwarz criterion	-4.446046
Log likelihood	87.80064	Hannan-Quinn criter.	-4.789013
F-statistic	0.024923	Durbin-Watson stat	1.925882
Prob(F-statistic)	0.999999		

d) Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.476530	Prob. F(8,22)	0.8596
Obs*R-squared	4.578427	Prob. Chi-Square(8)	0.8015
Scaled explained SS	1.783137	Prob. Chi-Square(8)	0.9870

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/26/16 Time: 20:00
Sample: 1977 2007
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001199	0.005095	-0.235404	0.8161
LNRGDP(-1)	0.000593	0.002469	0.240237	0.8124
LNRGDP(-2)	-0.000465	0.002419	-0.192253	0.8493
LNFDI	0.000554	0.000359	1.542947	0.1371
LNFDI(-1)	-0.000847	0.000512	-1.652817	0.1126
LNTROP	-3.04E-05	0.000513	-0.059312	0.9532
LNGSP	0.000531	0.000652	0.813522	0.4246
LNGSP(-1)	0.000620	0.000732	0.846519	0.4064
LNAGRIC	9.74E-06	0.000611	0.015935	0.9874

R-squared	0.147691	Mean dependent var	0.000206
Adjusted R-squared	-0.162239	S.D. dependent var	0.000260
S.E. of regression	0.000280	Akaike info criterion	-13.28533
Sum squared resid	1.73E-06	Schwarz criterion	-12.86901
Log likelihood	214.9226	Hannan-Quinn criter.	-13.14962
F-statistic	0.476530	Durbin-Watson stat	2.138375
Prob(F-statistic)	0.859576		