International Capital Flows: An Influence of the Level Of Infrastructural Development in Zimbabwe.

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Abstract: This research studied the impact of infrastructural development on FDI inflows into Zimbabwe using annual time series data ranging from 1994 to 2015. Explanatory variables that determine FDI that were included in the study include market size, trade openness and financial sector development. Using the OLS –Heteroskedastic and Standard Error Consistent White Test approach, the study found out that infrastructural development as measured by internet users (per 100 people) had a positive and a significant impact on FDI inflows in Zimbabwe in line with both theory and empirical predictions. Furthermore, market size, trade openness and financial sector development in line with literature were found to have had a positive and significant influence on FDI inflows into Zimbabwe. In order to improve the inflow of net FDI into the country, Zimbabwean authorities need to create a conducive environment that entices foreign investors to invest into the country. This includes the formulation and implementation of policies that enhances infrastructural development, open up trade with other countries and grow the economy.

Keywords: FDI; Infrastructure; GDP; Zimbabwe

JEL Classification: F13; F43; G10

1. Introduction

Foreign direct investment (FDI) flow has significantly increased in recent years. Total FDI inflow increased from US$0.69 trillion in 1980 to US$22.81 trillion in 2012 across the whole world (UNCTAD, 2012). Recent empirical work has found out that FDI influence economic growth in the host country if two conditions are met (1) absorption capacities must be present in the host country and (2) those absorption capacities should have reached a certain threshold level. For example, Adams (2009) noted that FDI failed to positively influence economic growth in Sub-Saharan Africa (SSA) countries because the absorption capacities present had not yet reached a certain threshold level needed to make use of the technology, knowledge and other skills associated with FDI. In line with the eclectic paradigm theory, infrastructural

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development is one of the absorption capacity and locational advantage of the host country that attracts FDI. There is actually a general consensus that infrastructural development is one of the absorption capacities that must be available in the host country to enhance its ability to positively influence FDI inflows. For example, Addison and Heshmati (2003) investigated the impact of information and communication Technology (ICT) on FDI inflows to developing countries. They found out that higher ICT development was one of the key factors that increased FDI inflows to developing nations. Ang (2008) in a study on FDI determinants in Malaysia found results which resonated with the infrastructure driven FDI proponents.

Globerman and Shapiro (2003) investigated the impact of governance infrastructure (regulation, legislation, property rights security, government transparency and legal frameworks) on United States (US) foreign direct investment using a two stage estimation procedure. They found out that countries that failed to achieve a certain minimum level of governance infrastructure could not attract FDI from the US. Moreover, higher levels of governance infrastructural development were observed to be a key and significant positive determinant of FDI from the US. Kumar (2001) examined the role of infrastructural availability on FDI inflows into developing countries using a cross country regression analysis. Transport, telecommunications, information and energy infrastructural development was found to be vital in determining FDI location decisions in developing countries.Whilst there appears to be a clear consensus as to the positive impact of both hard and/or soft infrastructural development on FDI, such a study has never been done for Zimbabwe to the best of the author's knowledge. It is for this reason that the current study decided to deepen the subject matter with Zimbabwe being the unit of analysis. This study uses FDI, net inflow (% of GDP) as a proxy for FDI and number of internet users (per 100 people) as a measure of infrastructural development. The proxy for FDI was deemed the best because it shows the change of foreign investment position within a given period of time. The number of internet users (per 100 people) was chosen as a proxy of infrastructural development because of lack of data in Zimbabwe of other infrastructure development components over a reasonable time frame that allow time series data analysis. This study is organized into five parts. The second part discusses the FDI-infrastructural development trends in Zimbabwe whilst the third part reviews literature on the relationship between infrastructure and FDI. The fourth part covers the research methodology whilst the fifth part concludes the study.

2. Infrastructural Development and Foreign Direct Investment Trends

The number of internet users (per 100 people) has been consistently on an upward trajectory from the year 1994 to 2015 in Zimbabwe (see Figure 1). The ratio of internet users in Zimbabwe was 0.002 per 100 people in 1994, which increased by

300% to reach 0.008 per 100 people in 1995. The five year period between 1995 and 2000 was characterised by a massive growth in the number of internet users in Zimbabwe. The ratio went up from 0.008 internet users per 100 people in 1995 to 0.401 internet users per 100 people in 2000, representing a huge increase by 4 912.5%. The period between 2000 to 2005 saw a further surge in internet users in Zimbabwe. The ratio went up by 498.5%, from 0.401 internet users per 100 people in 2000 to 2.4 internet users per 100 people in 2005. The upward trajectory continued during the five year period between 2005 to 2010 which saw internet users per 100 people going up by 166.67%. The ratio went up from 2.4 internet users per 100 people in 2005 to 6.4 internet users per 100 people in 2010.

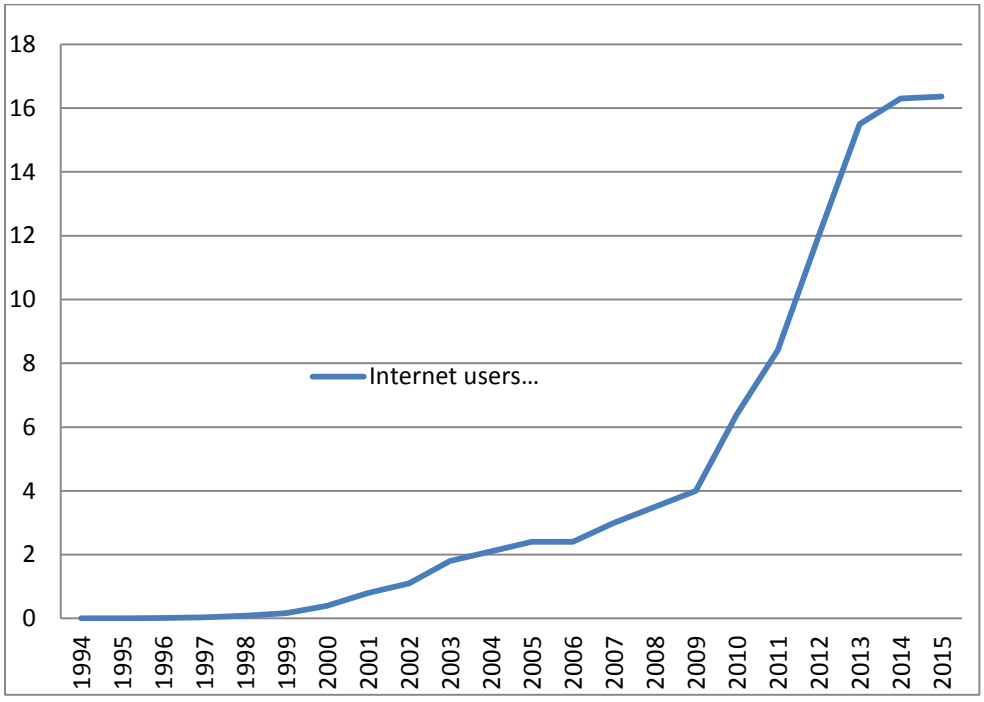

Figure 1. Internet users (per 100 people) trends for Zimbabwe (1994-2014)

Source: World Bank (2015)

Figure 1 show that the internet users in Zimbabwe further increased by 155.63% during the five year period from 2010 to 2015. They were 6.4 internet users per 100 people in 2010 and the figure surged to 16.36 internet users per 100 people in 2015 in Zimbabwe. Overally, the number of internet users per 100 people in Zimbabwe recorded a huge growth of 8 179% during the 22 year period ranging between 1994 to 2015. FDI trends in Zimbabwe shows mixed patterns during the 22 year period from 1994 to 2015 (see Figure 2). FDI net inflows as a percentage of GDP went up by a marginal 1.15 percentage points from 1994 to 1995, 0.50% in 1994 to 1.66% in

1995. The five year period between 1995 and 2000 saw FDI net inflows (% of GDP) declining by 1.31 percentage points, from 1.66% in 1995 to 0.35% in 2000. This was before FDI net inflows (% of GDP) experienced a 1.44 percentage points increase during the subsequent five year time period between 2000 and 2005. FDI net inflows (% of GDP) was 0.35% in 2000 and increased to 1.79% in 2005.

The five year time frame between 2005 and 2010 was characterised by a very marginal 0.03 percentage points decline in FDI net inflows (% of GDP) in Zimbabwe. FDI net inflows (% of GDP) was 1.79% in 2005 before declining to 1.75% in 2010 before experiencing a rebound during a subsequent five year time period between 2010 and 2015. FDI net inflows as a percentage of GDP was 1.75% in 2010 before reaching 3.09% in 2015, representing an increase of 1.34 percentage points during the five year period.

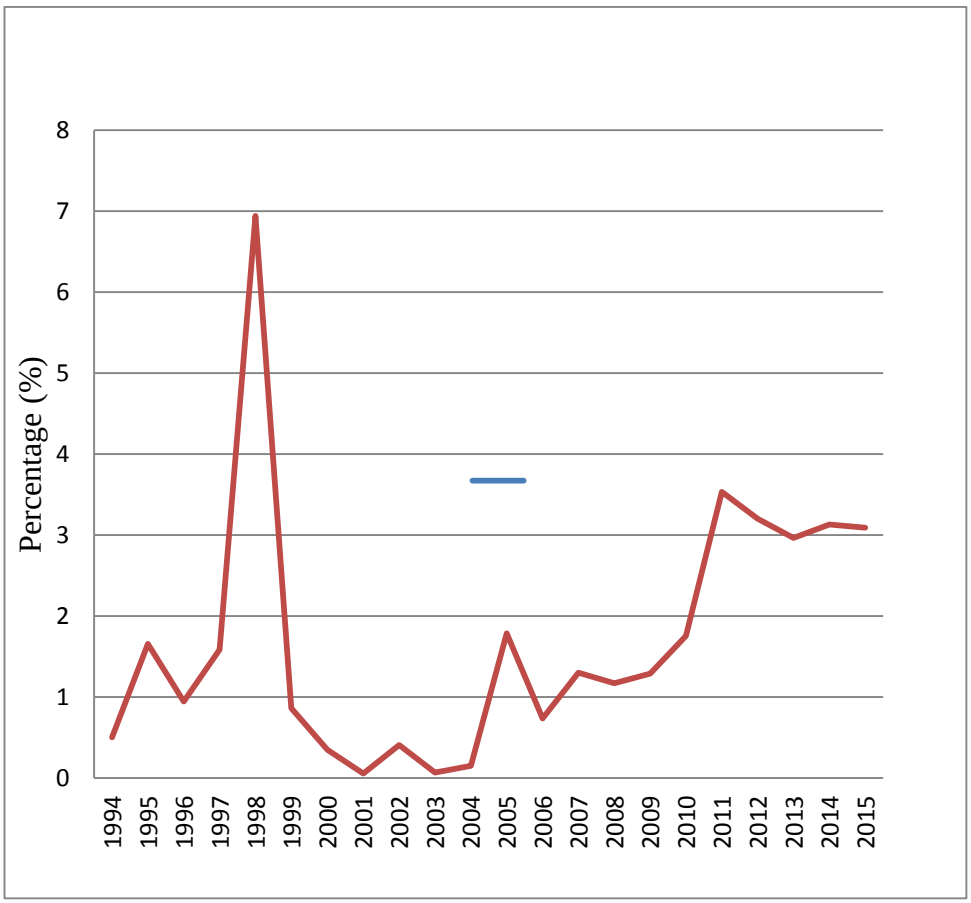

Figure 2. FDI trends for Zimbabwe (1994-2015)

Source: World Bank (2015)

3. Literature Review

There is overwhelming support for the infrastructural development-led FDI hypothesis both from theory and empirical evidence. Theoretically, the eclectic paradigm hypothesis founded by Dunning (1973) reported that ownership, location and internalisation (OLI) advantages are key determinants of FDI inflows into a host country. The ownership advantages that a firm requires in order to be able to compete abroad effectively include an edge that a firm has over its rivals despite being foreign such as brand name, patents and knowledge of technology (Wahid et al, 2009). "A firm that possess technology, monopoly and economies of large size advantages can enjoy higher profitability margins coupled by lower marginal costs of production if it decides to operate from abroad" (Dunning, 1973, p. 298). Location advantages include economic (market size, cost of transport, telecommunications, infrastructural development), political (favourable government policies) and social benefits which include distance between host and home countries, cultural diversity and attitude towards strangers that influence FDI flows (Denisia, 2010). Several empirical studies supported the infrastructural development driven FDI hypothesis. Mollick et al (2006) investigated the impact of infrastructure on FDI inflows into Mexico during the period between 1994 and 2001 using the Generalised Methods of Moments (GMM) approach. The findings of their study are twofold: The first is that the number of telephone lines was found to have played a very important in attracting FDI into Mexico. Secondly, higher levels of industrialisation were also critical in terms of positively influencing FDI across all states in Mexico. Asiedu (2002) examined the FDI determinants in Sub Saharan Africa (SSA). The study revealed that higher infrastructural development had a significant positive impact on FDI in non-SSA countries whilst infrastructure had a negligible influence on FDI in SSA countries.

Fung et al (2005) investigated the impact of hard infrastructure (highways and railroads) and soft infrastructure (reforms and transparent institutions) on foreign direct investment inflows into China using annual data from 1990 to 2002. Their study revealed that both hard and soft infrastructure had a significant positive influence on FDI in China. However, their study further observed that soft infrastructure had a more consistent and higher impact on FDI in comparison to the impact of hard infrastructure on FDI in China. Bellak et al (2009) examined the impact of infrastructure and corporate income taxes on FDI in Central and Eastern European countries using panel data analysis approach with data from 1995 to 2004. Their study revealed that both high infrastructural development and lower corporate income tax were central in attracting FDI into the host countries. They further observed that transport and communication infrastructural developments were the most key factors that positively attracted FDI into the host countries. Khadaroo and Seetanah (2008) analysed the impact of transport infrastructure on FDI in Mauritius during the period between 1960 and 2004 using an Auto Regressive Distributive Lag

(ARDL) and panel data analysis approaches. Using ARDL approach, transport infrastructural development was found to be one of the key determinants of FDI location decisions and attractiveness of FDI into the host countries. Panel data analysis also discovered that higher transport infrastructure played a major role in terms of attracting FDI inflows into Mauritius.

According to Denisia (2010), infrastructural development, state of the financial markets, political and macro-economic environment are part of the locational advantages within the OLI framework. Using panel data analysis with annual data from 1975 to 2009, Ranjan and Agrawal (2011) explored the determinants of FDI inflow into Brazil, Russia, India and China (BRIC). They found out that high infrastructural development, larger market size, high degree of trade openness and low labour cost attracted FDI into the BRIC countries. A study by Jordaan (2008) observed that good communication infrastructure, low labour cost, high quality of labour force and high regional demand positively attracted FDI inflow into Mexico regions. In a study of FDI inflow determinants for Indonesia in comparison with the whole of East Asia, Lipsey and Sjoholm (2011) noted that low FDI received by Indonesia was attributable to low infrastructural development, unfavourable business climate, inefficient government institutions and poor quality of education.

Investigating the impact of investment climate on FDI in developing countries using instrumental logit fixed effect model with firm level data from 2000 to 2006, Kinda (2010, p. 501) supported the OLI framework of the eclectic paradigm hypothesis by arguing that good financial market infrastructure in addition to good physical, human capital and institutional infrastructure provided a conducive environment that attracted FDI inflows into 77 developing countries. Calvo and Sanchez-Robles (2002) pointed out that the modernization theory is based on a fundamental principle in economics that economic growth requires capital investment. They further highlighted the fact that the transfer of technology through FDI is important because most developing countries lack the necessary infrastructure in terms of an educated population, liberalized markets, and social stability that are needed for innovation to promote economic growth.

The extent to which the economy can benefit from FDI inflows depends on the host country's specific conditions such as and the favourable policy environment, good infrastructure and the opportunities for linkages between FDI and domestic investment, argued Adams (2009, p. 947). According to Wang and Xie (2004), in order to benefit from the technological spillovers of FDI, so as to persistently promote economic growth, host countries should promote higher levels of infrastructural development. Moreover, investigating 23 developing countries using the individual fixed effects regression model, Wang and Xie (2009, p. 106) found out that host nations must ensure the availability of good institutional infrastructure so as to benefit from technological spillovers of FDI and realise economic growth. Factors such as physical infrastructure, financial market depth, good quality of

financial systems, extent of financial markets integration with the global financial markets, free trade agreements, human resources capabilities, cost of capital, favourable investment climate, consistent policy environment, financial constraints, balance of payment position, military expenditure and abundance of natural resources were found to be instrumental in determining FDI in developing countries. Babatunde (2011) studied the interaction between FDI, infrastructure, growth and trade openness in SSA countries using an unbalanced panel with data from 1980 to 2003. The study found out that a combination between higher levels of infrastructural development and trade openness led to more FDI inflows into the SSA counties during the period under study. On the other hand, Cheng and Kwan (2000) in a study of FDI determinants revealed that high infrastructural development and large size of the market were the key factors that attracted FDI into the Chinese regions.

Bakar et al (2012) examined whether or not infrastructure had any influence on FDI in Malaysia using time series analysis with annual data from 1970 to 2010. Their study revealed that infrastructure alongside other factors such as trade openness, market size and human capital development was a very important in influencing FDI in Malaysia. Rehman et al (2011) studied the impact of infrastructural development alongside exchange rate and market size on FDI in Pakistan using the Autoregressive Distributive Lag (ARDL) with time series annual data from 1975 to 2008. Infrastructural development was found to have led to more FDI inflows into Pakistan both in the short and long run.

Shah (2014) also investigated the impact of infrastructure in the developing countries on location decisions of foreign investors using panel data analysis with annual data ranging from 1980 to 2007. Infrastructure as proxied by telephone density in the developing countries was found to have had a very positive impact on FDI inflows. The same study also observed that exchange rate, economic growth and development also attracted FDI into the developing countries. Kaur et al (2016) studied whether infrastructural development and human capital development in India helped in attracted FDI using data from 1991 to 2010. Infrastructural development such as road network and railway transportation alongside human capital development were very instrumental in positively attracting FDI in India. Communication infrastructure and air transport had a positive but insignificant impact on FDI in India during the period under study. Khadaroo and Seetanah (2009) investigated the influence of infrastructure on attracting FDI in African countries using Generalised Methods of Moments (GMM). Both static and dynamic panel data analysis observed that transport infrastructure played a very significant role in attracting FDI into African countries during the period under study. The study further found out that other forms of infrastructure had a positive but less impact on FDI in African countries. Fitriandi et al (2014) also studied the role infrastructure played in promoting FDI inflows into the 30 provinces of Indonesia using panel data analysis with province level annual data ranging from 2000 to 2009. All the four measures of infrastructural

development, namely electricity, road length, water capacity and water distribution showed that infrastructure was a vital force in terms of attracting FDI inflows into Indonesia provinces.

4. Research Methodology

4.1. Data and Description of Variables

The study used time series annual secondary data for Zimbabwe ranging from 1994 to 2015. The data was extracted from the World Development Indicators, which is a very reliable international source of data. FDI is the dependent variable whose proxy used for the purposes of this study is the FDI net inflows (% of GDP). Internet users (per 100 people) is the proxy used to measure infrastructural development. As per the eclectic paradigm theory, high levels of communication infrastructural development attract more foreign investors, hence a positive relationship is expected between FDI and infrastructural development. Denisia (2010) noted that the state of infrastructure is a locational advantage of FDI which provide a conducive environment which not only attract FDI but enable FDI to influence economic growth in the host country. Availability of good institutional infrastructure helps the host countries to benefit from technological spillovers of FDI and realise economic growth (Wang & Xie, 2009, p. 106).

The market size hypothesis founded by Jorgenson (1963) noted that the level of GDP in the host country attracts FDI. This was supported by Denisia (1980, p. 13) who observed that economic growth in the host country is a location advantage of FDI in line with the eclectic paradigm hypothesis. This study used GDP per capita as a proxy of market size, following Sghaier and Abida (2013). According to Denisia (2010, p. 108), the level of trade openness in the host country is a political location advantage of FDI depending on whether it is high or low. The current study used a total of exports and imports as a ratio of GDP to proxy trade openness following Tsaurai and Odhiambo (2012). Guiso et al (2004) noted that a well-developed financial market attracts FDI and allow individuals and companies to easily access external funds at a low cost. Kaur et al. (2013) observed that financial markets increases the speed at which a host country benefit from FDI inflows through provision of financial support in terms of quicker transactions, availing of loans, good foreign currency services and optimal allocation of capital to more deserving projects. This study used stock market capitalization (% of GDP) as a measure of financial sector development. This study expects infrastructural development, market size, trade openness and financial sector development to have a positive impact on FDI in line with both theory and empirical findings. The data for all the variables used in this study was extracted from the World Development Indicators.

4.2. Model Specification

The function to examine the impact of infrastructural development on FDI alongside trade openness, financial sector development and market size is represented by the following general model specification.

FDI=f(infrastructural development, trade openness, market size, financial development) (1)

While infrastructural development is the main determinant of FDI in this study, market size, trade openness and financial sector development are significant explanatory variables for FDI (Hermes & Lensik, 2003; Alfaro et al, 2004; Kholdy & Sohrabian, 2008; Al Nasser & Soydemir, 2010, Asiedu & Lien, 2011). The study controlled the influence of the explanatory variables of FDI so as to boost the level of accuracy of the overall results. Specifically, the explanatory variables are controlled for in order to gauge the independent partial correlation between infrastructural development and FDI.

4.3 Estimation Technique

The first step in the estimation of the model which investigates the statistical relationships between FDI, infrastructural development, market size, trade openness and financial development is the determination of unit roots in the time series data. It is therefore important to check each time series variable for stationarity or unit root before conducting any analysis on the specified models. The regression analysis performed in a normal or traditional way gives spurious results if the time series data is non-stationary. It is against this background that stationarity of the time series data requires to be confirmed first before any statistical analysis is done. The study follows Elliot et al. (1996) in employing the Augmented Dickey-Fuller (ADF) test for unit root testing.

The Augmented Dickey-Fuller (ADF) is a unit root test for time series where the next equation tests the unit root:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_{it-1} \sum_{i=1}^{m} \Delta y_{t-1} + \varepsilon_t \quad (2)$$

where y_t is the variable in question, ε_t is white noise error term and

$$\Delta y_{t-1} = (y_{t-1} - y_{t-2}),\ \Delta y_{t-2} = (y_{t-2} - y_{t-3}) \quad (3)$$

These tests are applied to determine whether the estimated δ is equal to zero or not. Odhiambo (2004) observed that a cumulative distribution of the ADF statistics needs to be compiled in order to show that if the value of the calculated ratio of the coefficient is less than critical value from ADF statistics, then y is said to be stationary. Consistent with Bakar et al (2012), once all the variables used in the study become stationary, then the OLS (ordinary least squares) regression analysis with

Heteroskedastic and Standard Error Consistent White test can be performed to remove bias that arise due to non-constant variance.

4.4. Empirical Results

This sub-section deals with unit root testing and OLS regression analysis with Heteroskedastic and Standard Error Consistent White test.

Table 1. Augmented Dicky Fuller (ADF) for Unit Root Testing

Series	Levels		First Differences	
	No Trend	Trend	No Trend	Trend
FDI	-0.667121	-2.079225	-3.796632*** (S)	-3.891987**(S)
Infrastructure	-0.893810	-1.033057	-3.288468***(S)	-4.197775**(S)
Trade openness	0.798921	-1.934668	-3.630027***(S)	-3.655902**(S)
Market size	0.694628	-2.174505	-4.416069***(S)	-4.565646***(S)
Financial development	-0.766863	-1.908402	-3.383382***(S)	-4.029576***(S)

*Critical values are based on Mc Kinnon (1991)

** and *** denote significance at 5% and 1% respectively.

S represents stationary

Table 1 shows that all the variables at first difference are stationary (S) and therefore integrated of order 1. The long run relationship between the variables can now be estimated since all the variables have been confirmed to be stationary or integrated of order 1 at first difference using Augmented Dicky Fuller (ADF) approach.

Table 2. Ordinary Least Squares - Heteroskedastic and Standard Error Consistent White test

Variable	Co-efficient	Standard Error	T-statistic	Probability
Constant	13.3827***	1.5629	8.5627	0.000
Infrastructure	0.5621***	0.1774	3.1685	0.021
Trade openness	0.4813**	0.2439	1.9730	0.032
Market size	0.3802***	0.1332	2.8541	0.000
Financial development	0.7494*	0.3987	1.8795	0.085
R-squared	0.7629			
Adjusted R-squared	0.7528			

Source: E-Views (8)

*, **, and *** denote significance at 10%, 5% and 1% respectively.

Table 2 shows that FDI net inflows increase by 56.21% as infrastructural development goes up by 1% at one percent significant level. This result is consistent with the eclectic paradigm hypothesis founded by Dunning (1973) which observed that infrastructural development (transport, road, communication, electricity) is a locational advantage which attracts FDI into the host country. The results also supports findings by several empirical studies (Mollick et al, 2006; Fung et al, 2005; Bellak et al, 2009; Babatunde, 2011; Ranjan & Agrawal, 2011) on the subject matter. Moreover, a 1% increase in trade openness led to a surge in net FDI inflows by 48.13% at five percent level of significant. This resonate well with Denisia (2010) who argued that trade openness of the host country is a political locational advantage which attracts FDI, consistent with the eclectic paradigm theory. In addition, FDI net inflows went up by 38.02% in response to a 1% increase in the market size at one percent level of significance. This supports the market size hypothesis founded by Jorgenson (1963) which noted that GDP levels in the host country attracts FDI. The results also resonate with findings by Denisia (1980) that economic growth is a locational advantage of FDI in the host country in line with the eclectic paradigm theory. Last but not least, a 1% increase in the level of financial sector development pushed up the net FDI inflows into Zimbabwe by a massive 74.94% at 10% significance level. This is in line with empirical studies done by Guiso et al (2004) and Kaur et al (2013) which found out that financial sector development positively and significantly influence FDI through improving the rate at which a host country benefit from FDI by providing financial services faster.

5. Conclusion

This research studied the impact of infrastructural development on FDI inflows into Zimbabwe using annual time series data ranging from 1994 to 2015. Explanatory variables that determine FDI that were included in the study include market size, trade openness and financial sector development. Using the OLS –Heteroskedastic and Standard Error Consistent White Test approach, the study found out that infrastructural development as measured by internet users (per 100 people) had a positive and a significant impact on FDI inflows in Zimbabwe in line with both theory and empirical predictions. Furthermore, market size, trade openness and financial sector development in line with literature were found to have had a positive and significant influence on FDI inflows into Zimbabwe. In order to improve the inflow of net FDI into the country, Zimbabwean authorities need to create a conducive environment that entices foreign investors to invest into the country. This includes the formulation and implementation of policies that enhances infrastructural development, open up trade with other countries and grow the economy.

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