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Macroeconomic Environment and Foreign Direct Investment: A VECM Analysis for Tanzania

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Abstract:

The objective of this study was to determine the influence of macroeconomic environmental factors on inward FDI in Tanzania. The study employed quantitative approach using time series data from 1980-2011. Phillip Perron Unit Root Test, Cointegration Test and Vector Error Correction Model were applied in the analysis. Gross Domestic Product (GDP), Trade and telecommunication were found to have positive and significant influence on FDI. Inflation as a measure of macroeconomic stability was found to have negative impact on FDI. Development in telecommunication technology appeared to be the most influential predictor of inward Foreign Direct Investment. It is recommended that, the central bank should ensure the uprightness of the financial system, as required by section 6 (1) of the bank Act (2006) so as to sustain the broad economic policy of the government and support sound monetary condition, financing agricultural projects to raise crop production so as to control food inflation in the country. The government should put more effort in implementing the Private Sector Development Strategy (PSDS) in order to create conducive environment for investment, improving road infrastructure and implementing competition law and policy in electric power supply industry so as to eliminate power shortage.

Keywords: FDI, GDP, Trade, Infrastructure, Cointegration, VECM

1. Introduction

Foreign direct investment (FDI) is described as a driver of employment, technological advancements, productivity improvements, and greatly economic growth (Anyanwu, 2011). Multinational Enterprises (MNEs) are highly concerned more with the economic environment compared to other aspects of international business environment; it is alleged so because economic indicators have more powerful effect on FDI than political indicators (Mahmood and Ehsanullah, 2011; Mahmood et al., 2011). The most attractive destinations for Foreign Direct Investment are those with the most dynamic economies (Lautier and Moreau, 2011). Khrawish and Siam (2010) argued that there are significant and positive relationships between FDI flows into the economy and economic and financial variables. So, in this sense, FDI follows economic growth (Kiat, 2008) and stable macroeconomic environment promotes foreign direct investment (Hussain and Kimuli, 2012). Countries are striving in creating environment that will attract FDI. One of the reasons for this is explained by Ngowi (2001), that it is because of the assumed roles of FDI which include improved government revenue, predominantly through taxation, employment making, increasing exports and/or reducing imports, technology transfer, better managerial and entrepreneurial skills. Tanzania, has since 1985 changed its policies to allow and promote more trade and investments both domestic and foreign, some of the key changes are Trade and Exchange liberalization (Bank of Tanzania 2001). These include abolition of import and export licences, investment promotion reforms that geared at guaranteeing against nationalization, provision of tax holiday incentives and establishment of Tanzania Investment Centre as well as financial sector reform through which the government allowed foreign banks to operate alongside local banks. Macroeconomic indicators explain the economic performance of a country, so, a country that performs better is likely to attract more FDI. The volatility of macroeconomic variables (Gross Domestic Product and Exchange rate) on the other hand affects not only the volume and level of international trade but also the level of private investment and the flow of Foreign Direct Investment (Dhakai et al., 2010). Hailu (2010) argued that economic growth and economic competitiveness have been identified as formative factors for the inflow of FDI to developing countries including Africa. In Khoich and Madiyarova (2011) it was explained that FDI affects host countries' economic growth by transferring technology, increase human capital formulation and by stimulating domestic investment and access to global markets. FDI has strong positive effect on economic growth as it has been shown by Iftikhar et al. (2011) that FDI is the driving force in the growth process, this is because it enhances human capital and improves technology.

This study aimed at establishing the relationship between Foreign Direct Investment (FDI) and macroeconomic variables namely Gross Domestic Product (GDP), Inflation, Trade openness, Domestic savings and Infrastructure.

1.1. FDI Inflows in Tanzania

Opening up to FDI has seen a significant transformation in the structure of Tanzania's exports. The Tanzania Investment Centre (TIC) data indicate that FDI inflows have increased from USD 123 million in 1995, rising to USD 516.7 million in 1999, USD 374.4 in 2001 and USD 240.4 in 2002. Tanzania received USD 695.5 million in foreign direct investment (FDI) in 2008 compared to USD 653 million recorded in 2007, which is an equivalent to an increase of 6.4 percent. From the year 2000 to 2010, a total of 4955 were registered in Tanzania amongst which 2564 were FDI and only 2391 were local investments, among the FDI projects 1241 were owned fully by foreigners and 1323 were joint ventures. In this regard, therefore, FDI is a very important component of Tanzania economy. For instance, in 2011 Tanzania registered a total of 825 investment projects, amongst which 363 were FDIs, 172 total foreign ownership and 191 were joint ventures. Projects registered in 2011. Figure 1 shows that GDP has grown much more than country's inward FDI, but it can be seen that, the more GDP grows the more inward FDI increases significantly. This tells that GDP may have been one of the contributing determinants of FDI growth in Tanzania, though the investigation of how Tanzania's GDP impact FDI is not well established. So, this analysis will fulfil this purpose. Statistics show that, from 2002/2003 FDI inflow showed a favourable growth, the drop in 2009 was contributed by global economic crisis during which some investors cancelled their projects.

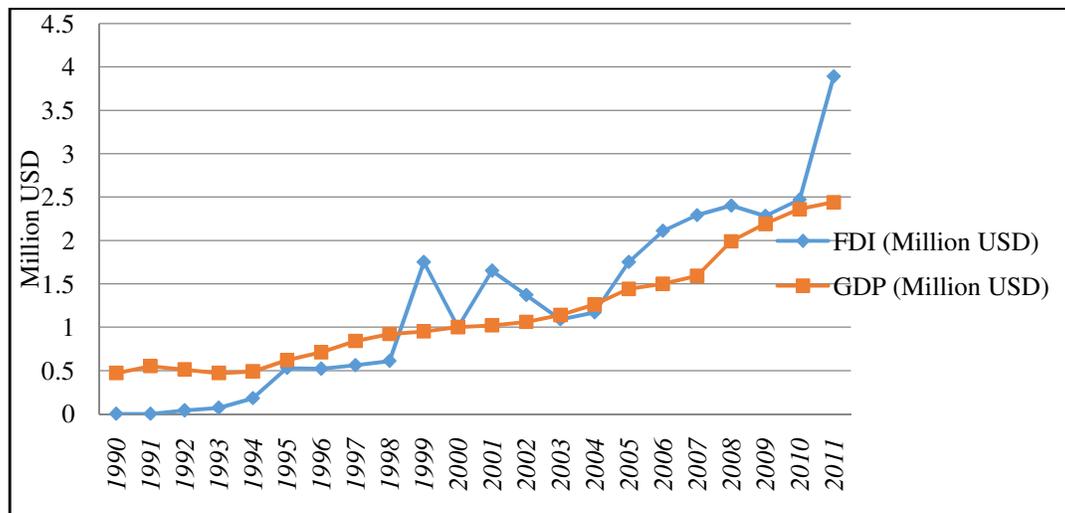


Figure 1: Trends of FDI and GDP in Tanzania 1990-2010

Source: UNCTAD Stats (2015)

Note: Index 2000= 1

1.2. Statement of the Problem

Despite of the importance of FDI to the economy still Tanzanian macroeconomic environment is not beneficial for international investment. Poor infrastructure and unstable inflationary trends are some of the setbacks for creating favourable environment for international business. Tanzania remains a rather insignificant market for foreign investors because the GDP is still amongst the lowest in sub-Saharan Africa. In addition, unstable power supply and poor roads and Transportation infrastructure have been termed by some companies as threats to investment (Swiss Embassy, 2010). Many studies in Tanzania measured the impact of FDI on economic growth; for example, Yona (2000), Charle (2001), Simon (2003), Masanja (2008), Mnyanyi (2008) and Otaru (2009), but all these did not address the influence macroeconomic environment on FDI. Furthermore, Inflation which is the most significant determinant of macroeconomic stability has been very high in Tanzania to the extent that in the 32 years it has been at an annual average of above 7% for 23 years, it reached the highest value of 47% in 1988 (IMF World Economic Outlook, 1980-2011).

1.3. Study Objectives

1.3.1. General Objective

The main objective of this study was to determine the influence of macroeconomic environmental factors on Foreign Direct Investment in Tanzania.

1.3.2. Specific Objectives

The study was steered by the following specific objectives

- i. To establish the relationship between size of the economy and FDI inflows.
- ii. To find out the most influential predictor of FDI among selected macroeconomic factors.
- iii. To determine whether macroeconomic stability of the economy matters in attracting foreign investment.

1.4. Significance of the Study

The results of this study will add new ideas to the body of knowledge with regard to macroeconomic variables and Foreign Direct Investment. In addition, the findings of this study will help policy makers to know the importance of creating macroeconomic

environment that favours inward FDI. This study is important for Tanzania in particular because it has included such factors like availability of electric power, road and telecommunication as determinants of FDI as many studies have ignored these macroeconomic factors.

1.5. Scope and Limitations of the Study

The study has considered FDI inflows in the period of 32 years 1980-2011. In addressing the problem stated, the study has treated FDI inflows as the dependent variable that is influenced by different macroeconomic variables. There are many macroeconomic indicators that may have impact on Foreign Direct Investment but not all Macroeconomic variables were taken into consideration for the purpose of this particular study, only GDP, Inflation (in percentage), Trade openness (export and import as percentage of GDP), Savings (as percentage of GDP) and Infrastructure have been studied. The variables that were chosen to represent infrastructure are telecommunication, electric power consumption, roads in total kilometres and road sector energy consumption. These variables were chosen because of data availability and their importance in business activities. Similarly, variables like commercial vehicles per 100 inhabitants, newspapers per 1000 inhabitants, number of roads, or paved road as percentage of total number of roads could have been used (Kumar, 2001; Onyeiwu, 2004), but unfortunately the data covering the whole-time scope of this study were not available. The study covered data for the period of thirty-two years; 1980 to 2011. However, this study encountered a problem in getting relevant data from a single source, for this reason the researcher collected data from different authorities. The study is specific for Tanzania, so it must be regarded as such. The results might be different for the similar variables and approach in other countries.

2. Literature Review

Ambrose (2009), conducted a study on the Determinants of FDI in Tanzania, using time series data she included Exchange rate, Inflation, trade openness, tax and corruption perception index in her empirical model. Her study also did not consider the role of infrastructure on FDI. As empirical studies differ regarding the impact of different macroeconomic factors on FDI across nations so this justifies a need to establish and analyse the relationship between macroeconomic variables and FDI inflow specifically for Tanzania. Hara and Razafimahefa (2005) established that FDI inflows are highly sensitive to changes in the size of the market- an expansion (or contraction) of 1% of the domestic market leads to an increase (or decrease) of approximately 20% of FDI inflows. Using Panel regression covering 1975-1999 for developing countries in Latin America and the Caribbean, Asia, Sub Saharan Africa (Tanzania was not included), Onyeiwu (2004) found that Openness, Infrastructure, rate of return on investment and corruption are significant variables for FDI flows to developing countries. In the same study, he asserts that MENA countries behave differently from other developing countries. In estimating a fixed effects panel regression for MENA countries only, results showed that only corruption/Bureaucratic red tape and openness were significant variables for FDI flows to MENA region, but economic growth, infrastructures, and inflation did not influence FDI to MENA region. On the other hand, Mottaleb (2004) used panel data from 60 low-income and lower-middle income countries in Asia, Latin America and Africa (Tanzania was not included), found out that countries with larger GDP and high GDP growth rate and which maintain a business-friendly environment with abundant modern infrastructural facilities, such as internet (communication infrastructure) can successfully attract FDI.

Mhlanga et al. (2009) did an empirical investigation on FDI inflows to Southern Africa Development Community (SADC) countries. They first estimated the model using Ordinary Least Squares (OLS) by pooling observations from 14 countries (Tanzania included) and across 12 years. The estimations held that FDI projects can be explained by market size, openness to trade, infrastructure development, and country risk. GDP growths, return on investment and inflation rate had the expected signs but were insignificant. Growth of the host economy was also found to be more important for Greenfield investments. In a similar vein, Wadhwa and Reddy (2011) carried a study in 10 developing Asian countries, the time period of the study was from 1991 to 2008. They divided the independent variables into three main groups regarding motives of FDI inflows; the first group came from marketing seeking FDI factors (GDP, annual population growth, exports of goods and services as a percentage of GDP). The next group belonged to resource seeking FDI factors, in which they involved imports of goods and services as a percentage of GDP, export, internet users per 100 people, mobile phones subscriptions per 100 people, paved roads as a percentage of total roads in the country, and lastly, efficiency seeking FDI factors presented by annual inflation. GDP and exports showed the significant and positive relationship with FDI. Imports, internet users and mobile subscribers showed significant relationship and paved roads showed insignificant relationship. Inflation as a measure of macroeconomic stability had a negative effect on FDI. Another study which included both Sub-Saharan African (SSA) countries and non-sub-Saharan African countries was done by Asiedu (2002); she found that trade openness increases FDI to both SSA and non SSA countries. However, some empirical researches differ significantly with the theoretical points of view. Using time series data from 1975-2008 and applying Generalized Method of Moments (GMM) with autoregressive error technique, Oke et al. (2012) found that the index of energy consumption to be positive and significant predictors of FDI in Nigeria at 5 percent significance level, and inflation rate is insignificant determinants of FDI in the country.

2.1. Macroeconomic Factors and Foreign Direct Investment

2.1.1. Gross Domestic Product and FDI

GDP is a measure of the size of any economy. Krugman and Obstfeld (2006) justify the importance of GDP in attracting trade and FDI. Their findings showed that in recent years more FDI's flowed between rich countries.

2.1.2. Inflation and FDI

Inflation is a macroeconomic factor of consideration as it may tell a story about economic stability of a country (Hailu, 2010). Hasan (2007) argued that technologically developed and economically stable countries or regions attract large quantity of FDI in the World. MNEs faced with an institutional environment of high inflation will in all likelihood experience uncertainty in the capital budgeting and long-term planning. As a result, the capital of MNEs is exposed to higher risks and increased insecurity and costs (Wyk and Lal, 2008). Kiat (2008) found that in developed economies there is enough evidence to show that a decrease in inflation can cause a positive increase in FDI inflow, while this evidence is not clear in developing countries and Least Developing Countries (LDCs). Other research findings show that inflation do impact GDP negatively (Abas, Akbar, Nasir, Ullah, and Naseem, 2011), so theoretically it reduces FDI although this is the question of empirical investigation. High inflation rate can serve as disincentive on FDI to a country as it increases the user cost of capital because inflation is a great measure of macroeconomic stability, hence, the higher the inflation the more unstable is the economy.

2.1.3. Trade openness and FDI

There are quite number of empirical studies on trade and FDI, some of these proved wrong the theory developed by Mundell (1957) which claimed that trade barriers influence capital flows among nations. Mundell alleged that investment is a substitute of trade but Mhlanga et al. (2009) found infrastructure development and openness of the economy to have positive effects on FDI. Onyeiwu (2004) found openness to have significant influence on FDI and Anyanwu (2012) observed that the increase in trade openness has caused more FDI to flow into African countries.

2.1.4. Domestic savings and FDI

Literature about domestic savings and FDI is very limited, Mahmood et al., (2011) argued that a country can develop faster by investing more in human or physical capital or in research and development, but that a country with international capital markets cannot grow faster by saving more; domestic saving is not an important ingredient in the growth process.

2.1.5. Infrastructure and FDI

Kumar (2001) recommended that availability of good quality physical infrastructure could also improve the investment climate for foreign direct investment (FDI) by subsidizing the cost of total investment by foreign investors and thus raising the rate of return. However, poor infrastructure or unavailability of public inputs increase costs for firms (Rehman and Ilyas, 2011). Goodspeed et al. (2006) concluded that sufficient electric power in the economy attracts FDI but better infrastructure was found to have no influence on FDI in MENA region (Onyeiwu, 2004).

2.2. Knowledge Gap

Most of the studies regarding FDI have been done in explaining the role of FDI to economic growth (Dabour, 2000; Falki, 2009; Nourbakhshian et al., 2012), many of such studies had been done in Asian economies (Chukiathajorn, 2009; Khrawish and Siam, 2010; Wadhwa and Reddy, 2011). Theoretically, GDP influences higher foreign investment, but as shown in literature above the situation differs significantly in empirical analysis. Charle (2001), Simon (2003), Masanja (2008) and Otaru (2009) wrote on FDI and economic growth in Tanzania and their approach was guided by the assumption that FDI causes economic growth. However, this assumption was already put into doubt by Chowdhury and Mavrotas (2003) who found Chile's GDP to have influence on inward FDI and not vice versa. In their conclusion, they said that the assumption that FDI causes growth is somewhat invalid and therefore economic growth should be a base for attracting FDI. This study has gone far beyond the monetary and fiscal policy and included variables for physical and telecommunication infrastructure.

3. Methodology

3.1. The Empirical Model

This study has proposed the following empirical model for Macroeconomic Environment and Foreign Direct Investment (FDI) in Tanzania; the model is based on the ideas of Beghum et al. (2011) and Kumar (2001). However, the author of this study changed some variables and added more variables to include infrastructure. Similar model though not the same was applied by Mahmood and Ehsanullah (2011).

FDI = f (GDP, INFLATION, OPEN, SAVINGS, INFRASTRUCTURE) (1)

The study has used four variables to proxy infrastructure; electric power consumption, telecommunication, road network and energy consumption in road sector. Therefore, the linear empirical model for analysis became:

FDI= f (GDP+ INFL+ OPEN+ SAV+ ELECPC+ TELECOM+ ROADNET+RSEC) (2)

Where:

FDI = total Foreign Direct Investment inflows in the country in million USD, GDP = Gross Domestic Product in million USD, INFL = annual inflation in percentage, OPEN = trade openness (total export and import as percentage of GDP), SAV= Domestic savings as percentage of GDP, ELECPC = Electric power consumption per capita in Kilowatt hour, TELECOM = Telecommunication measured by Telephone lines per 100 people, ROADNET= total road coverage in a country (in kilometres), RSEC= Road sector energy consumption as percentage of total energy consumption. Therefore, in this study, regression analysis was done regarding the following equation:

$$FDI = \beta_0 + \beta_1GDP + \beta_2INFL + \beta_3 OPEN + \beta_4 SAV + \beta_5ELECPC + \beta_6TELECOM + \beta_7ROADNET + \beta_8RSEC + \epsilon_t \dots\dots\dots (3)$$

Where β_0 is a constant and ϵ_t is an error term representing other macroeconomic variables that influence the inflow of FDI in the country but are not integrated in the model. β_1 to β_8 are the corresponding coefficients of the independent variables.

3.2. Study Hypotheses

Regarding the literature cited, the following hypotheses were developed and tested in the course of this study.

- Hypothesis 1: Gross Domestic Product positively influences FDI inflow, the influence is significant.
- Hypothesis 2: There is a significant relationship between FDI and Inflation; high inflation rates of the host country impact inward FDI negatively.
- Hypothesis 3: There is a positive significant relationship between trade openness and inward FDI.
- Hypothesis 4: The relationship between FDI and domestic Savings is negative.
- Hypothesis 5: Electric power consumption positively affects FDI.
- Hypothesis 6: There is a positive significant relationship between telecommunication and FDI.
- Hypothesis 7: There is a relationship between FDI and road infrastructure; availability of better and effective roads positively affects FDI but poor road infrastructure affects FDI negatively.
- Hypothesis 8: Higher energy consumption in road sector influences FDI positively, lower energy consumption in road sector would affect FDI negatively.

3.3. Data Collection and Data Sources

Data utilized in this study were secondary. Such data were selected as apt source of information based on the nature of the study, that it necessitated the use of macro data. One advantage of secondary data is found in Adam and Kamuzora (2008) that it broadens the data base from which specific generalization can be made. The study employed time series data covering the time period of 32 years; from year 1980 to 2011. Data for this study were collected from various sources as follows; UNCTAD Stat, IMF, World Bank, African Development Indicators, Bank of Tanzania, Trading Economics, TANESCO (for electric power consumption per capita (2009-2011) and TANROADS (for road network 2009-2011). These sources were selected because they are relied upon and recognised worldwide or at least countrywide as consistent data sources. Unless otherwise stated all data, sources were accessed through online database, except TANESCO and Bank of Tanzania.

3.4. Data processing, Analysis and Interpretation

Time series data were analyzed and the interpretation of the findings was performed by statistical measurements provided by Statistical package (STATA). Prior to application of Vector Error Correction Model (VECM) three statistical tests were done; Normality test (to see whether data are normally distributed), Unit Root Test (to check whether data are stationary), co-integration test (to test the long run relationship between variables). Lastly, the error correction model was introduced to determine whether the differenced non-stationery variables capture both short run and long run dynamics.

3.5. Statistical Analysis of Time Series Data

3.5.1. Normality test

As shown in the Table 1 Normality test was carried out by undertaking the descriptive statistics of the variables at levels. The values of the mean and median are closer to each other; this implies that data for our variables are normally distributed. Although there is normality, still there is couple of tests to be done before running the final regression analysis.

| | Mean | Median | Max. | Min. | Std. Deviation | Skewness | Kurtosis |
|--|--------|--------|---------|--|----------------|----------|----------|
| FDI | 245.69 | 149.26 | 1095.4 | -8.42 | 292.735 | 1.04142 | 3.2939 |
| GDP | 9755 | 8152.5 | 23295 | 4218 | 5346.92 | 1.28310 | 3.6794 |
| INFL | 18.89 | 20.3 | 47.7 | 4 | 11.9692 | 0.36428 | 2.2110 |
| OPEN | 40.97 | 36.673 | 81.3157 | 15.101 | 16.017 | 0.44305 | 2.7558 |
| SAV | 16.18 | 16.802 | 25.615 | 4.759 | 5.77752 | -0.3028 | 2.2519 |
| ELEC | 56.34 | 55.5 | 87 | 34 | 16.1577 | 0.49281 | 2.3849 |
| TEL | 0.336 | 0.3029 | 0.50999 | 0.2111 | 0.09112 | 0.26669 | 1.9371 |
| ROAD | 74261 | 85706 | 103809 | 34227 | 21810.5 | -0.85576 | 2.2463 |
| RSEC | 3.314 | 2.7221 | 5.99322 | 2.1848 | 1.24427 | 0.94329 | 2.3214 |
| Number of observation (N) = 32 Max. = Maximum Min. = Minimum | | | | TEL = TELECOM ROAD = ROADNET ELEC = ELECPC | | | |

Table 1: Summary of Descriptive Statistics
Source: Author's computation derived from data analysis (2015)

3.5.2. Unit Root Test

Time series analysis needs data that are stationary over time (data that have no unit root). Data were tested using Phillip Perron (PP) unit root test. PP tests the order of integration of the variables. Regressing data that are non-stationary; more than likely will yield to incorrect results because their means change over times. Otherwise Augmented Dickey Fuller (ADF) test could be used but the PP test was preferred basing on Phillip and Perron (1988) because it is superior to ADF since it transforms the test statistic to eliminate any autocorrelation in the model.

| VARIABLE | PP Test Statistics | Order of Integration |
|----------|--------------------|----------------------|
| FDI | 1.706 | I(1) |
| GDP | 2.304 | I(1) |
| INFL | -1.619 | I(1) |
| OPEN | 0.046 | I(1) |
| SAV | -2.54 | I(1) |
| ELECPC | 0.255 | I(1) |
| TELECOM | -0.96 | I(1) |
| ROADNET | -1.303 | I(1) |
| RSEC | 0.645 | I(1) |

Table 2: Unit Root Test Results: at levels

Source: Author's computation derived from data analysis (2015)

Note:

(i) McKinnon (1991) critical values are used to reject the null hypothesis of the unit root

(ii) I (0) means the variable is stationary

(iii) I (1) means the variable is integrated at order one

(iv) Critical values for PP are *** 1% = -3.709, **5% = -2.983 and *10% = -2.623

After carrying the PP test at levels as presented in Table 3 above, all variables were not stationary, implies that we failed to reject the null hypothesis at levels. Therefore, the unit root test was performed at first difference.

Ho: at first difference, all data are not stationary, or have unit roots

| VARIABLE | PP Test Statistics | Order of Integration |
|----------|--------------------|----------------------|
| FDI | -6.136 | I(0) *** |
| GDP | -5.783 | I(0) *** |
| INFL | -8.075 | I(0) *** |
| OPEN | -4.111 | I(0) *** |
| SAV | -5.527 | I(0) *** |
| ELECPC | -6.351 | I(0) *** |
| TELECOM | -2.845 | I(0) * |
| ROADNET | -4.108 | I(0) *** |
| RSEC | -8.935 | I(0) *** |

Table 3: Unit Root Test Results: at first difference

Source: Author's computation derived from data analysis (2015)

Note:

(i) McKinnon (1991) critical values are used to reject the null hypothesis of the unit root.

(ii) I(0) means the variable is stationary

(iii) I(1) means the variable is integrated at order one

(iv) Critical values for PP are *** 1% = -3.716, **5% = -2.986 and *10% = -2.624

With regard to results in Table 3, at first difference all variables rejected the null hypothesis of the existence of unit root at 1% level (for FDI, GDP, INFL, OPEN, SAV, ELECPC, ROADNET, and RSEC) and at 10% level (for TELECOM). Consequently, data were stationary or happened to have no unit root at first difference.

3.5.3. Co-integration Test

Co-integration analysis was done to indicate whether the explanatory variables persuade the dependent variable and if there is long run relationship between the variables. According to Engle and Granger (1978), even though the individual time series have unit root (are non-stationary) their linear transformation can be stationary due to equilibrium forces which tend to keep such series together in the long run. If such situation happens, the variables are co-integrated and error correction term exists to accounts for short term deviations from the long run equilibrium relationship. Table 4 gives a summary of co-integration test results.

Ho: variables that are non-stationary at levels will not be stationary in the long run, or there is no co-integration amongst the non-stationary variables in the long run.

| Maximum rank | Eigen Value | Trace statistics | 5% Critical value |
|--------------|-------------|------------------|-------------------|
| 0 | | 551.4149 | 208.97 |
| 1 | 0.99730 | 374.0214 | 170.80 |
| 2 | 0.96420 | 274.1269 | 136.61 |
| 3 | 0.94272 | 188.3351 | 104.94 |
| 4 | 0.90985 | 116.1472 | 77.74 |
| 5 | 0.76425 | 72.7978 | 54.64 |
| 6 | 0.66952 | 39.5811 | 34.55 |
| 7 | 0.51077 | 18.1333* | 18.17 |
| 8 | 0.36813 | 4.3613 | 3.74 |
| 9 | 0.13530 | | |

Table 4: Johansen Test for Co-integration
 Source: Author's computation derived from data analysis (2015)

The results in Table 4 rejected the null hypothesis of no co-integration at 5% level since critical value is large than the trace statistics. The implication is that the variables are co-integrated and hence there is a long run relationship between independent and dependent variables. If our variables are co-integrated, then the error correction model can be applied.

3.5.4. Error Correction Model (VECM)

Error correction model is introduced to incorporate the error term. The error term account for other variables that may have influence on the dependent variable but are not included in our empirical model. The error term was generated and included in the regression equation to form the error correction model; therefore equation 3 becomes.

$$FDI = \beta_0 + \beta_1 DGDP + \beta_2 DINFL + \beta_3 DOPEN + \beta_4 DSAV + \beta_5 DELEPCPC + \beta_6 DTELECOM + \beta_7 DROADNET + \beta_8 DRSEC + \beta_9 L_ECT + \epsilon_t \dots \dots \dots (4)$$

Note: L_ ECT = the variable generated to account for an error term, a letter D means that variables were stationary at first difference.

| Dependent variable = FDI | | | | |
|--|-------------|------------|-------------|-------------|
| Variable | coefficient | Std. Error | t-statistic | Probability |
| C | -269.172 | 138.265 | -1.95* | 0.064 |
| DGDP | 0.0315734 | 0.0109235 | 2.89*** | 0.009 |
| DINFL | -3.448383 | 1.755421 | -1.96* | 0.063 |
| DOPEN | 6.82909 | 2.504135 | 2.73** | 0.013 |
| DSAV | -1.732001 | 2.055059 | -0.84 | 0.409 |
| DELEPCPC | 2.060023 | 3.852794 | 0.53 | 0.598 |
| DTELECOM | 1291.438 | 260.5318 | 4.96*** | 0.000 |
| DROADNET | -0.0043959 | 0.0017787 | -2.47 ** | 0.022 |
| DRSEC | -53.9733 | 36.65646 | -1.47 | 0.156 |
| L_ ECT | -0.3603414 | 0.2313443 | -1.56 | 0.134 |
| R-squared = 0.9646 | | | | |
| Adjusted R-squared = 0.9497 | | | | |
| Probability (F-statistic) = 0.0000 | | | | |
| Durbin-Watson statistic (original) = 2.180341 | | | | |
| Durbin-Watson statistic (Transformed) = 1.909921 | | | | |

Table 5: Regression results of the VECM
 Source: Author's computation derived from data analysis (2015)

4. Findings and Discussion

Considering the results of the preferred model in Table 5, the value of R-square; 96.46% is satisfactory and the signs of the coefficients concur with the hypothesis stated. Only inflation appeared to be negative and significant. The values of the coefficients for GDP and TELECOM after error correction are still positive and significant at 1% level. The value for OPEN is now positive and significant at 5% level, though before error correction it was significant at 1% level. The coefficient of electric power consumption (ELECPC) is positive though not significant. The coefficient of inflation (INFL) is negative and significant at 10% level. ROADNET is negative and significant at 5% level while electric power and both domestic savings (SAV) and road sector energy consumption is positive and negative respectively. All the three have insignificant effect on FDI inflow.

Taking the coefficients to the error correction model equation 4 took a form of:

FDI = -269.17 +0.032GDP -3.448INFL+ 6.829OPEN -1.732SAV+ 2.06ELECPC+ 1291.44TELECOM -0.004ROADNET-53.97RSEC-0.36L_ECT..... (5)

This implies that when GDP increases by 1 unit, the quantity of FDI increases by 0.032 units, holding other factors constant. The increase in GDP value promises a great market in the future so encourages investors to come. Also, GDP conforms to the literature that the increase in GDP (size of the economy) helps to attract more FDI. Therefore, the increase in the value of GDP encourages foreign investors to come in the country.

In addition, increase in the degree of openness would cause FDI to increase by 6.829 units. This means that trade is very important in attracting foreign investors, hence the greater the degree of openness, the higher is the economy considered to be friendly to investors. Telecommunication infrastructure has contributed a lot in attracting FDI in Tanzania. For instance, *ceteris paribus* 1 unit increase in the value of TELECOM attracted 1291.44 units of FDI. Among all the positive variables this appeared to be the most influential predictor of FDI. On the other hand, improvement in communication infrastructures gives confidence to investors that they will perform business effectively because communication is the stronghold of business activities, for communication infrastructure reduces costs of advertisement and publicity. Inflation and road network significantly reduced FDI, the percentage increase of inflation rate caused FDI to decrease by 3.448. Road network has been reducing FDI by 0.004, a magnitude that is significant hence the negative relationship is due to the poor road infrastructures in the country many of which are not functioning during rainy season. Poor road infrastructure, being the major mode of transport, discourages investors. The coefficient for electric power consumption is insignificant, yet the increase in 2.06 units of FDI is because of development in the electric power infrastructure, other factors held constant. This tells that availability of electric power in the country gives investors confidence that the economy can support machines and modern equipment used in industrial activities. The insignificance of these variables is because of frequently power failures. It is also shown that domestic savings and road sector energy consumption are insignificant, although they cause FDI to decrease by 1.732 and 53.97 units respectively. The negative sign of domestic savings would be probably because of large percent of savings is not aimed for investment rather than for future consumption. Since many foreign investors in Tanzania prefer joint ventures, savings that are not directed to investment is a stumbling block to foreign investors.

The results have given answer to our objectives; that the size of the economy matters in attracting foreign investors. Results indicate that FDI in Tanzania is highly contributed by the improvements in Telecommunication and increase in the value of Gross Domestic Product and Trade. So, Tanzanian macroeconomic stability matters in attracting FDI since the higher the inflation rate, the lower the FDI. The coefficient of GDP is positive and significant at 1% level. This means, the GDP and FDI are positively related, implying that there is a relationship between the size of the economy and FDI inflows. Although Tanzania is among the countries with lower GDP, the increase of the GDP every year gives a bright future promise for foreign investors. The Results showed that the increase in a unit value of GDP caused FDI to increase by 0.032 units, and its influence is statistically significant. This is further supported by the literature that the size of the economy matters in attracting FDI. This study has revealed that macroeconomic stability of Tanzania is not friendly to investors because higher inflation rates discourage foreign investors as they reflect a more risky and unstable macroeconomic environment. As a measure of macroeconomic stability, low inflation is preferred by foreign investors and higher inflation is disincentive to investors. The sign of this variable was expected to be negative and significant. The findings met the study hypothesis at 10% level after error correction; this means higher inflation is a detrimental factor for FDI. Study found trade openness to be significant and positively related to FDI at 5% level. This concurs with literature that trading with the rest of the world has influence in attracting foreign investment. However, it differs with the findings of Jayachandran and Seilan (2010) who found out that there is no relationship between trade and FDI in India. The study found that trade open ness attracts the findings indicated that savings happened to be insignificant and a negative value of its coefficient may be due to the fact that majority in the economy do not save for investment but rather for consumption purposes.

Telecommunication on the other hand is very important in business. Availability of communication facilities proves that the economy is capable of supporting business transaction at a low cost possible. Positive and significant relationship was expected from this variable in which a 1% level of significance revealed that more FDI came into Tanzania following the development of telecommunication industry. This variable was found to be the most influential predictor of FDI in Tanzania. The increase in electric power consumption per capita normally promises investors that the economy has the ability to support modern industrial machines and equipment. Increase in the value of electric power consumption affects FDI positively. This concurs with the findings reported by Goodspeed et al. (2006) who unfolded that electric power consumption influences FDI positively. Insignificant of this variable might be because of the electric power failures which are common in Tanzania. The study findings show that this variable has negative and significant effect on FDI; the negative influence more than likely to be is contributed by poor roads, because most of the roads in Tanzania are not usable during heavy rain seasons, hence, investors are discouraged. This agrees with Moody and Srinivasan (1998) findings who argued that high level of economic development as reflected by adequate infrastructure is very important factor to attract foreign investors. Lack of reliable road infrastructure discourages investors because poor roads increase transportation costs. In addition, although total road network has been increased over the years, absence of more paved roads is a threat to foreign investors; this variable was included so as to evaluate whether in the road sector there are significant activities to improve road transport. Kumar (2004) in his study included this variable in his empirical model and the result showed that the percentage of energy in the road sector reflected the efficiency of the road sector in the economy. But for our case the road sector in Tanzania is not attractive to foreign investors.

5. Conclusion and Recommendation

5.1. Conclusion

The core objective of this study was to establish the relationship between macroeconomic environmental factors and FDI in Tanzania. The study employed quantitative approach using time series data from 1980-2011. Phillip Perron Unit Root Test, Cointegration Test and Vector Error Correction Model were applied in the analysis. It was found that, Gross Domestic Product (GDP), and Trade have positive relationship with FDI. Variables for infrastructure related differently to FDI; telecommunication and electricity consumption per capita showed positive relationship, the insignificance of the coefficient of electric power consumption is because of the severe power failures in the country; still electricity supply is not stable. Roads total network, road sector energy consumption per capita appeared to be negative. Savings was included to represent financial variables and it appeared to have negative relationship with FDI. In attaining the specific objectives of this study, it was found that the size of the economy matters in attractive investment from abroad. Development in communication technology appeared to be the most influential predictor of FDI in the country. As the impact of inflation on FDI was a negative and significant then macroeconomic stability matter in attracting FDI. Furthermore, the role of infrastructure in FDI has been well established; the study shows that FDI in Tanzania does not only depend on monetary and fiscal variables but also on physical infrastructure. On the other hand, Savings showed to be insignificant and negatively related to FDI; this shows that majority in the country save for consumption and not for investment and therefore lack of domestic investment discourages foreign investors.

5.2. Recommendation

Basing on the findings, the following are recommended; the central bank should ensure the uprightness of the financial system, as required by section 6 (1) of the bank Act (2006), so as to sustain the broad economic policy of the government and support sound monetary condition. Moreover, financing agricultural projects to raise crop production will also help reduce food inflation in the country. The government should put more effort in implementing the Private Sector Development Strategy (PSDS) in order to create conducive environment for investment and businesses and to promote multinational participation in production and trade, this can create more wide trade openness. Power shortage should be eliminated so as to provide efficient environment required for manufacturing sector; consideration to open the power supply industry for private sector participation will eliminate the monopoly of one company hence create competitiveness which will results into more efficiency and reliable power supply in the country. The medium strategic focus of the government on physical infrastructure has to put optimal efforts in improving road transport because this is the most used mode of transport and from this study we have found it has impacted FDI negatively. So, measure is to be taken to eliminate inadequate infrastructure services such as poor roads and also reduce high port charges and replace slow and outdated communication facilities with modern efficient equipment that will attract more investments.

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