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# THE EFFECT OF SECTORIAL FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH IN ZAMBIA

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**ABSTRACT**

*Zambia has sought to attract Foreign Direct Investment because of the many benefits that it brings to the economy. Foreign Direct Investment is considered beneficial not only because it brings in the much-needed capital, but also generates employment and provides access to advanced technologies and other spill-overs. It has been argued that Foreign Direct Investment has a positive impact on the economic performance of the host country because they exploit the host factor endowments there by lowering their production cost and increasing their export competitiveness which leads to increased GDP.*

*The main purpose of this study was to ascertain the effect of Sectorial Foreign Direct Investment on Zambia's Economic Growth covering the period from 1980 to 2016. Endogenous growth model was employed for the study with emphases on the effect of FDI inflow into agriculture, manufacturing, mining and construction sectors in Zambia. The study employed Autoregressive Distributed Lag- Error Correction Model (ARDL-ECM) technique. A main advantage of the ARDL-ECM approach is to find both short run and long run effects. Additionally, this technique is appropriate for a small sample size (Pesaran, 1999). Hypotheses were formulated and tested using ARDL-EC model and the test for stationarity proves that the variables are integrated in I (0) and I (1) order which implies that unit roots do not exist among the variables at different orders. There is also long-run equilibrium relationship between the variables and the result also confirms about 89 percent short-run adjustment speed from long-run disequilibrium. The coefficient of determination indicates that about 98 percent of the variations in gross domestic product are explained by changes in its determinants in Zambia.*

*The long run results show that mining, construction and agriculture sectors have significant positive impact on economic growth. The FDI has a significant positive impact on the GDP growth of Zambia both in long-term and in short-term. On the other hand, manufacturing has significant negative impact on the economic growth in Zambia.*

*The study therefore recommends that concerted and well-articulated efforts should be made to promote foreign direct investment into mining, construction and agriculture sectors as they constitute an integral part of the growth and transformation process of an natural resource based economy like that of Zambia this will induce employment, increase financial access and income of the various economic agents which will have a spillover effect on economic growth.*

***Keywords:*** *Error Correctin Model,Economic Growth, Foreign direct investment, Cointergration,Stationarity, Zambia*

## CHAPTER ONE: INTRODUCTION

### 1.0 Overview

Foreign direct investment (FDI) has played a leading role in many of the economies of the region. There is a widespread belief among policymakers that foreign direct investment (FDI) enhances the productivity of host countries and promotes development.

Countries seek to attract as high foreign direct investment flows as possible because of their various benefits to economies

### 1.1 Background

Foreign direct investments (FDI) are the net inflows of investment to acquiring long lasting management interest in an enterprise operating in an economy other than that of the investor (World Bank, 2014). Many reasons have been given for the importance of FDI inflows, including employment creation, enhanced competition as well as the transfer of skills through training. For these reasons, developing countries have been strongly on foreign direct investment as a source of external finance. Accordingly, many governments have developed policies to encourage inward FDI flows. Furthermore, FDI gives developing countries the opportunity to reduce dependence on foreign aid, thereby boosting the state's sovereignty from donor policies.

Inekwe (2013) argues that although policymakers promote Foreign Direct Investment (FDI) in accelerating economic development in developing countries, the links between economic development, FDI and human development remain uncertain and thus further research is required to understand the relationships. Understanding of the impact of FDI in developing countries is generally limited and or rather confusing as different researchers such as Moyo (2009), Chaudhuri & Banerjee (2010) and Imoudu (2012) have produced contradictory results.

Madem, Cudla & Rao (2012) argued that if FDI is to result in accelerated economic growth, priority should be given to investment in industries with the greatest impact on economic development. This means that research on sectorial FDI in developing countries is needed to inform policymakers on which economic sectors to promote FDI into in order to have the greatest impact on economic growth, human development and poverty alleviation. In addition to sectorial FDI's varying impact on economic growth, Wang & Wong (2009) also argue that various forms of FDI that is 'brownfield' and 'greenfield' investment in different economic sectors tend to have different impacts on economic growth. This also suggests that understanding of which sectorial FDI has the greatest impact on economic development should be sort in the context of which economic sector has a greater absorptive capacity to a particular form of FDI.

FDI inflows into developing countries have been on the rise and by 2010 the developing economies and transition economies together were receiving more than half of the world's FDI inflows. The major reasons for increased FDI inflows into developing countries can be attributed to improved democracy and political stability in developing countries, globalization and increased degree of financial integration of the world economies.

Further, the increased need for resources by the developed countries from developing countries as well as the need to access new less competitive markets by multinational companies originating from developed countries have also been instrumental in driving inflows (Mottaleb & Kalirajan, 2010; Alam & Shah, 2013; Goswami & Haider, 2014).

### 1.2 Statement of the problem

Foreign Direct Investment (FDI) has a key role to play in the development trajectory of any economy. This is particularly true for a developing country like Zambia where there is a strong relationship between foreign investment and economic growth. FDI boosts international trade through increased export earnings, promotes global best practices, is non- debt creating, provides growth through gross capital formation, creates employment and stimulates inflows of foreign currency. To add to this, FDI facilitates technology transfer, increases and accelerates opportunities for the domestic market. The government's major obligation is to ensure that FDI contributes to the economic well-being of citizens in their respective communities by channeling investments into zones

that have the most potential to create decent jobs and reduce poverty.

The economy registered net foreign direct investment inflows valued at US $3,194.9 million in 2014, up from US $1,690.5 million in 2013. Despite the achievements recorded, the country is still faced with key domestic and external challenges. The country's poverty levels remain high, with 60.5 percent of the population classified to be poor (CSO, 2010). Youth unemployment among the 15-35 years age group stands at 10.0 percent (CSO, 2012).

The country's non-traditional exports (all exports excluding copper and cobalt) also exhibited a favourable upward trend, rising from US $1,046.1 million in 2008 to US $3,558.4 million in 2013 before declining to US $2,272.1 million in 2014. During the same period the Zambian economy slowed down growth by 2.8 percent in 2015 compared with 5.1 percent in 2013. The growth was mainly driven by a large margin of wholesale and retail, agriculture and manufacturing sectors but construction, mining and quarrying had a sluggish growth. Despite the country's FDI mainly attracted in the mining sector, the sector has not contributed to economic growth as expected. In terms of a sectoral distribution of FDI inflows in Zambia, the commodity sector (mining) continued to dominate, though its share in total FDI inflows declined to 52.8 percent in 2017 from about 60.0 percent in 2007. (FPIR, 2012 & 2015)

Further, the country has, for a long time, relied mainly on copper as the major source of export earnings, accounting for an estimated average of 71.0 percent of total earnings. Successive Governments' efforts to diversify the economy away from copper mining into other growth sectors have not yielded the desired results. The mining and quarrying sector has continued to attract relatively higher levels of direct investment, while other sectors have not attracted the desired levels of investment despite sector-specific investment incentives. This resonate well with Madem, Cudla & Rao (2012) who argued that if FDI is to result in accelerated economic growth, priority should be given to investment in industries with the greatest impact on economic development as a case of Zambia. The Zambia growth in the recent past can be seen been contained by nontraditional export earnings.

Therefore, despite the well-intended diversification policies, the favourable GDP growth rates have not translated into diversified economic activities across sectors. It is vital to overcome the challenges with regard to diversification of the economy, and the promotion of sustainable growth and poverty reduction. Hence, this calls for rethinking, refocusing and implementing investment and export diversification strategies for sustainable economic development

As has been discussed in the introduction also, FDI inflows in Zambia have been on a steady rise and the trend is expected to continue into the foreseeable future, the only challenge that Zambia is faced with is how to ensure that the FDI inflows in the country result in accelerated economic growth.

Therefore, there is need to examine different sectors apart from the traditional sector (mining) the impact they could have given a relative foreign direct investment inflow to accelerate economic growth in Zambia. Having the knowledge of which sectors can accelerate the economic growth given FDI into these sectors will help policy makers to make policies that promote FDI into priority sectors cardinal for growth.

### 1.3 Objectives of the Project

The main research objective, seeks to empirically determine the effect of sectorial FDI inflows on the macroeconomic performance of Zambia's economy.

### 1.4 Specific Objectives

I. Empirically assess the significance of sectors on the economic performance in Zambia.
II. To determine the short-run relationship between FDI and economic growth in Zambian.
III. To determine the long-run relationship between FDI and economic growth in Zambian.
IV. To identify policy implications of fid-economic growth relationship for the economy of Zambia.

### 1.5 Hypotheses

I. $H_0$: Manufacturing does not have a significant impact on Economic Growth in Zambia.
$H_1$: Manufacturing does significantly impact Economic Growth in Zambia.

II. $H_0$: Mining does not have a significant impact on Economic Growth in Zambia.
$H_1$: Mining does significantly impact Economic Growth in Zambia

III. $H_0$: Construction does not have a significant impact on Economic Growth in Zambia.
$H_1$: Construction does significantly impact Economic Growth in Zambia

IV. $H_0$: Agriculture does not have a significant impact on Economic Growth in Zambia.
$H_1$: Agriculture does significantly impact Economic Growth in Zambia

V. $H_0$: Increased FDI inflow does not increase economic performance in Zambia.
$H_1$: Increased FDI inflow does increase economic performance in Zambia.

## CHAPTER TWO: LITERATURE REVIEW

### 2.0 Overview

In order to explain the effect of FDI on host country economic development and how different sectors of the economic can contribute to the growth of the economy. Essentially, the reviews are packaged in two separate sub-sections including theoretical review and empirical review. In the course of this review, efforts were made to link the objectives of the study to existing literature to enable us do a detailed discussion of findings in this research. Prior to theoretical and empirical review, it imperative to understand the importance of FDI and different sectors in which it can be attracted into.

### 2.1 Theoretical Framework

The theoretical perspectives can be split into two groups: the dependency theories and endogenous growth.

#### 2.1.1 Dependency theory

Dependency theory is based on the Marxist thought. Dependency scholars argue that developing economies face negative impact from foreign investment due to profit repatriation, declining reinvestment and income inequality. Therefore, foreign direct investment inflows to the "periphery" distract local firms, stifle technological innovation and "crowd out" domestic firms (Dixon and Boswell, 1996). Dixon and Boswell (1996) also concluded that FDI shows a positive impact on growth in the start, yet in the long run the reliance on foreign investment shows a negative effect on growth. The institutions and infrastructure support further FDI and negative spillovers such as income inequality unemployment and over-urbanization.

Similarly, Moran (1978) suggests that foreign investors destroy host country political processes by adopting the local elites and/or by utilizing their influence in their home countries. It is argued that the benefits of FDI are poorly distributed between (Multinational Corporations) MNC and the host country. MNC starts an economic surplus that could have been utilized for financing international development. The economists primarily promoted the dependency theory of FDI and its impact on economic development in developing countries throughout the 1970‟s and 1980‟s.

Furthermore, in line with the dependency theory, Kentor (1998) supported the fact in his study, that the countries with relatively high foreign capital dependence (measured as accumulated foreign stock) show slower economic growth than less dependent countries. These results are also supported by the findings of Dixon and Boswell (1996). Kentor (2003) uses a different measure to foreign investment concentration which is calculated as the percentage of total FDI stocks considered for by the top financing country and still includes a long-term negative effect. According to Kentor, foreign investment concentration shows a significant, long term negative effect on growth; its impact is intense over the starting five years and drops overtime.

#### 2.1.2 Endogenous growth

Romer (1986) presented the endogenous growth theory and he is considered as one of the main contributors to this theory. Endogenous growth reveals how FDI plays an essential role to economic

growth through labor training and skill acquisition not only through capital accumulation and technology transfer. According to this theory, technology transfer, expansion of the level of knowledge ascends through training and skills of labor. In the same way, through the introduction of alternative management practices and organizational arrangements, domestic firms can emulate from FDI. Thus, FDI may lead to output growth by increasing total factor productivity due to an observed distribution of technology and increased efficiency through better marketing, managerial structure, and superior technology (Blomstrom et al., 1996; Borenztin et al., 1995; de Mello 1997, 1999). Additionally, endogenous growth literature has shown country conditions that are relevant for FDI to have positive effects on growth such as the interdependencies between domestic and foreign investment, appropriate level of human capital, open trade regimes, and well-developed financial markets.

**2.2 Empirical Review**

This sub section seeks to explore contemporary debates and various schools of thought around key themes found in recent and relevant literatures which give insight into FDI, economic sectors' FDI absorption capacity, economic growth and how these key themes are woven together. As a departure point, the literature review builds an overall understanding of FDI, its determinants and impact of various economic sectors setting the scene for a discussion around sectorial FDI and economic growth. Thereafter an exploration of arguments around economic fundamentals that link sector FDI and economic growth as well as sector FDI absorption capacity will be discussed in greater detail.

Carlos (2009) argues that FDI leads to economic development due to capital accumulation and the fact that the interaction between FDI and host country generates positive long-term spillovers to various stakeholder groups. On the other hand, however, some authors including Moyo (2009) and Adams (2009) argue that developing countries reliance on foreign investment has negative effects on economic growth and income distribution due to negative spillovers that foreign companies may bring to the host countries. Kennedy, Bardy & Rubens (2012) present an argument which is somewhere between the above noted extreme views in the sense that they argue that if FDI is to result in accelerated economic growth, priority should be directed to investments in industries that have the greatest impact on economic development; otherwise the benefits of the FDI will not be fully realized.

**Theoretic Linkage of Sectorial FDI and Economic Development**

As has been the theme of this literature review FDI can either have positive or negative impact on economic growth depending on a variety of factors which include the motives of the foreign investors and the economic sector absorptive capacity. The challenge is to ensure that FDI contributes positively to economic development by taking measures to maximize positive spill-overs and minimize the negative effects.

Madem, Cudla & Rao (2012) suggest that FDI should be prioritised in industries that have greater positive spillover effects in employment creation, technology development and transfer, manpower and skills development, and industries that benefit mass consumption as opposed to increasing consumption by small group of privileged elites. The high levels of unemployment in developing countries requires FDI to be directed to labour intensive industries such as agriculture and fisheries, mining and quarrying ensuring that the developing countries receive the benefits of FDI as a tool of fighting unemployment and poverty in the lower end of the economic sectors (Madem, Cudla & Rao, 2012).

There are case studies available in literature that discusses sectorial FDI and its impact on economic growth. Chaudhuri and Banerjee (2010) analysed the impact of Greenfield FDI on agricultural land in a developing economy and their results concluded that increased FDI in agriculture improves unemployment of both unskilled and skilled labour as well as national welfare. The study upholds the view that FDI inflow into agriculture in the developing economies is very

desirable towards managing the huge unemployment level of unskilled workers.

Imoudu (2012) examined the relationship between disaggregated FDI into various economic sectors, economic growth and the factors that drive FDI in Nigeria for the period between 1980 and 2009. The results show that FDI in manufacturing, agriculture, and petroleum sectors have had little impact on economic growth while FDI into service sectors such as telecommunications has yielded better impact on real economic growth.

The author proposes that the differences in the sector FDI impact on economic growth were due to different industries absorptive capacity built from past infrastructure. In addition, telecommunications assist in the opening up of the economy and allow for more efficient production and trade.

In a latter study, Inekwe (2013) examined the links between economic growth, unemployment and FDI in Nigeria for the manufacturing and services sectors for a ten-year period commencing 1990 until 2009. The results show that FDI in the services industry results in positive economic growth while FDI in the manufacturing sector has a negative economic growth. Although the research produces interesting results on the relationship between manufacturing sector and economic growth, the research did not give explicit reasons why the manufacturing sector resulted in negative economic growth.

The author however recommended that FDI into manufacturing sector should be directed into productive manufacturing units. Further, the results also revealed that FDI in the manufacturing sector has had a positive relationship with employment rate while FDI in the servicing sector a negative relationship with employment rate was observed. The reason for this relationship is that the manufacturing sector employs more people than those required in the service industry.

Noland, Park & Estrada (2012) study shows that in Asian countries because the manufacturing sector is automated the sector is less labour intensive relative to the services sector which tends to be more labour intensive. The results of their study produced statistical evidence that growth of the services sector is associated with poverty reduction. The reason is that the service industry tends to support both the primary and the secondary sectors of the economy. They also concluded that growth in the services sector results in more inclusive growth and political stability.

Madem, Cudla & Rao (2012) research observed that sectors with high government support tend to receive a good share of FDI inflow and have a better absorptive capacity which ultimately results in positive economic growth. This was also because government was able to build infrastructure and institutions that intensify the absorptive capacity.

The aftermath of the 2008/ 2009 global economic and financial crisis brought a new dynamic in terms of sustainability, economic growth and FDI in industry's sensitivity to business cycles. For economic growth and sustainability, developing governments should seek to attract FDI in both high growth sensitive industries such as chemicals and the automobile industry and not overlook the balance that relatively resilient industries such as pharmaceuticals and food and beverage products bring to sustainable economic growth.

De Mello (1997) found positive effects of FDI on economic growth in both developing and developed countries, but concludes that the long-run growth in host countries is determined by the spillovers of knowledge and technology from investing countries to host countries. Similarly, Balasubramanyam et al. (1996) found support for their hypotheses that the growth effect of FDI is positive for export promoting countries and potentially negative for import-substituting ones. Comparing evidence from developed and developing countries, Blonigen and Wang (2005) noted that the factors that affect FDI flows are different across the income groups. Interestingly, they find evidence of beneficial FDI only for developing countries and not for the developed ones, while they find the crowding-out effect of FDI on domestic investment to hold for the wealthy group of nations. In addition, Vu and Noy (2009) study on sectoral analysis of foreign direct investment and growth in developed countries with a

particular emphasis on the sector impacts of FDI on growth reveal that, FDI has no statistical and positive effects on economic growth through its interaction with labour. Moreover, they found that the effects seem to be very different across countries and economic sectors. Also, using simultaneous equations model,

Ruxanda and Muraru (2010) examined the relationship between FDI and economic growth in the Romanian economy. Their findings suggest a bi-directional causation between FDI and economic growth.

In Nigeria, many works have been done to establish the relationship between FDI and economic growth. Some of these works include Okon et.al, 2012, Aluko (1961), Brown (1962) and Obinna (1983), Adelegan (2000) etc. Aluko (1961), Brown (1962) and Obinna (1983) findings suggest a positive relationship between FDI and economic growth in Nigeria while Okon et.al, (2012) examine if there is any sort of feed-back relationship between FDI and economic growth in Nigeria using single and simultaneous equation systems. The results obtained show that FDI and economic growth are jointly determined in Nigeria and there is positive feedback from FDI to growth and from growth to FDI. Adelegan (2000) examine the impact of FDI on economic growth with Seemingly Unrelated Regression model. He found that FDI is pro-consumption, pro-import and negatively related to gross domestic investment. In another paper, Similarly, Ayanwale and Bamire (2001) assessed the influence of FDI on firm level productivity in Nigeria and reported positive spillover of foreign firms on domestic firm productivity.

Accordingly, studies such as Ayanwale (2007) and Akinlo (2004) focused on the oil and non-oil sector. These studies assessed the impacts of FDI inflows to the extractive industry on Nigeria‟s economic growth. Akinlo (2004) specifically controlled for the non-oil FDI dichotomy in Nigeria. Using error correction model, he investigated the impact of foreign direct investment (FDI) on economic growth in Nigeria. He found that both private capital and lagged foreign capital have small and not a statistically significant effect on economic growth. Further, his results support the argument that extractive FDI might not be growth enhancing as much as manufacturing FDI. Egwaikhide (2012) also investigates the relationship between foreign direct investment (FDI) and economic growth in Nigeria, Johansen Cointegration technique and Vector Error Correction Method in which FDI is disaggregated into various components. The Johansen Cointegration result establishes that the impact of the disaggregated FDI on real growth in Nigeria namely: agriculture, mining, manufacturing and petroleum sectors is very little with the exception of the telecom sector which has a good and promising future, especially in the long run. Furthermore, past level of FDI and level of infrastructures are FDI enhancing.

Ayadi (2009) investigates the relationship between FDI and economic growth in Nigeria and discovered weak correlation and causality between the variables and recommends that infrastructural development, human capital building and strategic policies towards attracting FDI should be intensified. In the same vein, Osinubi and Amaghionyediwe (2010) examined the relationship between foreign private investment (FPI) and economic growth in Nigeria. Their findings suggest that FPI, domestic investment growth, net export growth and the lagged error term were statistically significant in explaining variations in Nigeria economic growth while Ayashagba and Abachi (2002) evidenced a significant impact on economic growth.

**2.3 Summary and Research Gaps**

A review of previous literature review has demonstrated a specific need for research that examines specific economic sector impact of FDI on economic growth (Inekwe, 2013; Noland, Park & Estrada, 2012; Imoudu, 2012; Chaudhuri and Banerjee, 2010). This is set to contribute to the quest to inform policy on which sectors should FDI be attracted in order to achieve accelerated economic growth. Furthermore, the literature review has validated that while FDI may have positive impact on economic growth the extent to which FDI can impact growth is determined by the various sectors' absorptive capacity (Imoudu, 2012; Gohou &

Soumare, 2009). There is also need for research in the developing countries that details conditions precedent for sector FDI to have an increased impact on economic growth.

## CHAPTER THREE: RESEARCH METHODOLOGY

### 3.0 Preamble

Research methodology shows the steps taken by the researcher to arrive at the results (Nnamocha, 2005). The methodology deals with model specification, data requirements, sources of data and method of data analysis.

### 3.1Research Design.

This study, being a quantitative study, it used a quasi-experimental design in order to answer the research hypotheses posed. This type of design involves selecting groups, upon which a variable is tested, without any random pre-selection processes. In social sciences, where pre-selection and randomization of groups is often difficulty, the design is an ideal one in generating results for general trends. Quasi-experimental design is often integrated with individual case studies; the figures and results generated often reinforce the findings in a case study, and allow some sort of statistical analysis to take place. In addition, without extensive prescreening and randomization needing to be undertaken, the design does reduce the time and resources needed for experimentation.

### 3.2 Data source and validity

This study is largely based on secondary data time series data and incorporated primary data sourced through interviews. The Bank of Zambia publications, the Central Statistics Office and the Zambia Development Agency are the main sources of the data. Some data was also obtained from the World Bank publications. The data in this study is therefore valid and reliable and it covered the period from 1980 to 2016. This study looks at the FDI inflows in different sectors of the economy and how this relationship affects the entire economy of Zambia.

### 3.3 Method of Data Analysis

The analytical framework of this study includes pre estimation analysis such as descriptive statistics and stationarity test. This is to reveal the behaviour of the data on the variables. The stationarity test will investigate the stationarity of the variables; non-stationarity could lead to spurious regression results. Such spurious relationship between/ among variables may be evident in time series data that exhibit non-stationary. The test for the presence of long-run equilibrium relationship is carried out based on the bounce cointegration technique. The error correction model (ECM) is applied to tie the short-run dynamics of the co-integrating equations to their long-run statics dispositions.

### 3.4 Model Specification

In order to test the hypotheses above, an econometric model is formulated. In order to analyze the effect of sectorial FDI on economic growth in Zambia, the Error Correction Model (ECM) is estimated to find out long-run causality and short-term dynamics if there is an evidence of co-integration relationship among the variables. The model measures the influence of log of foreign direct investment (*lnFDI*), log of manufacturing (*lnMANU*), log of mining (*lnMIN*), log of construction (*lnCON*) and log of agriculture (AG) on log GDP (*lnGDP*). The time series data were converted into natural logs form in order to remove sharpness in the time series data (Karagol, 2006). This log transformation is the best option for unbiased empirical evidence (Sezgin, 2004). The research used Stata 14 for model estimation. In line with the above discussion, the model adopted by this study is specified as follows:

$$\boldsymbol{lnGDP} = (\boldsymbol{lnFDI}, \boldsymbol{lnMANU}, \boldsymbol{lnMIN}, \boldsymbol{lnCON}, \boldsymbol{lnAGRI}) \ldots . (\boldsymbol{i})$$

However, this equation (i) can now be stated in econometric form to account for the stochastic variables

$$\Delta \ln\_GDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta \ln\_GDP_{t-1} + \sum_{i=1}^{p} \alpha_{2i} \Delta \ln\_FDI_{t-1} + \sum_{i=1}^{p} \alpha_{3i} \Delta \ln\_MIN_{t-1} + \sum_{i=1}^{p} \alpha_{4i} \Delta \ln\_MANU_{t-1} + \sum_{i=1}^{p} \alpha_{5i} \Delta \ln\_CON_{t-1} + \sum_{i=1}^{p} \alpha_{6i} \Delta \ln\_AGRI_{t-1} + \lambda ECT_{t-1} + \varepsilon_t \ \ldots\ldots (ii)$$

Where:

Ln_GDP = natural log of Gross Domestic Product,

Ln_ FDI = natural log of foreign direct investment,

Ln_ MANU = natural log of manufacturing sector,

Ln_ MIN = natural log of mining sector,

Ln_ CON = natural log of construction sector and

Ln_ AGRI = natural log of agriculture sector.

Where λ is the speed of adjustment parameter with a negative sign and $ECT_{t-1}$ is the error correction term which reflects the deviation from the long-run equilibrium path. This allows causality to be determined in two ways namely: Short run causality, which is determined by the lagged differences of the variables and; Long-run causality, which is determined by the significance of the coefficient of the error-correction term.

Whereas $\alpha_1$, $\alpha_3$, $\alpha_3$, $\alpha_4$, $\alpha_5$ and $\alpha_6$ are short run dynamics coefficients of the model's adjustment long-run equilibrium. The error term, $\varepsilon_t$ is as assumed to be independent and identically distributed and *t* = time subscript. The expected signs of the above equations are $\alpha_0 > 0$, $\alpha_1 < 0$ and $\alpha_2 <$ or $> 0$ (i.e. positive or negative).

**Estimation Procedure**

Since this study utilized time series data it employed Stationarity tests to test for unit root, namely the graphical method, Augmented Dickey Fuller test (ADF) and Phillip-Perron (PP) test. Both ADF and PP tests test the null hypothesis of a unit root. The null hypothesis of a unit root is rejected in favor of the stationary alternative in each case if the test statistic is more negative than the critical value.

Stationarity means that a variable's mean, variance and covariance are constant over time. This implies that the mean, variance and covariance do not change over time. Stationarity tests are performed on data in order to avoid the problem of spurious or nonsensical regression.

To determine the order of the AR process, one strategy is to include lags whose coefficients are significantly different to zero; another more common strategy is to use a lag selection criterion such as the Akaike information criterion (AIC) or the Hannan Quinn information criterion (HQ). In this study, the Hannan-Quinn information criterion is used to choose the number of lags to be included.

The long run relationship test used was the bounds tests for co-integration, this test was selected because it can be used to test for co-integration in a series where variables are stationary at different orders, that is regardless of the regressors being in the order of I(0) or I(1).

**Error Correction Model:** The study used the Error Correction Model (ECM) to estimate long-run causality and short-term dynamics an evidence of co-integration relationship among the variables.

## CHAPTER FOUR: RESULTS AND DISCUSSION

### Data Presentation, Analysis and Interpretation of Results

The analytical framework of this study consists of six basic steps carried out on the models specified above. They include; presentation of data descriptive statistical analysis, unit root test, stability test, error correction model (ECM), co-integration test.

### 4.1 Descriptive Statistics

The table below shows the descriptive statistics of the data. The table reports the mean, standard deviation, minimum, maximum, kurtosis and skewness values of the data included in the study.

Table 4. 1 Descriptive Statistics

| Variable | MEAN | MEDIAN | MAX | MIN | *std. Dev* | *Kurtosis* | *Skewness* |
|---|---|---|---|---|---|---|---|
| ***lnRGDP*** | 22.51566 | 22.10825 | 24.05709 | 21.23126 | .844424 | 1.970128 | .6862366 |
| ***lnFDI*** | 19.25582 | 19.28146 | 21.48328 | 11.51293 | 1.718198 | 12.19604 | -2.324505 |
| ***lnMIN*** | 7.443163 | 7.240717 | 8.853149 | 6.480437 | .7081627 | 2.229669 | .7178857 |
| ***lnMANU*** | 20.46995 | 20.42621 | 21.33936 | 19.62168 | .5826195 | 1.57812 | .0001198 |
| ***lnCON*** | 5.517507 | 4.99568 | 7.792113 | 3.41235 | 1.462329 | 1.673916 | .4483356 |
| ***lnAGRI*** | 20.48497 | 20.27035 | 21.58923 | 19.12517 | .648096 | 2.266637 | .1455532 |

***Total 37 observation is used.**

The statistic description is reported in Table 4.1. The research had total of 37 observations. As can be seen, the mean value of *lnFDI* is relatively small in comparison with the mean of *lnRGDP*. For some years, there were very little foreign direct investment and for some years, high figures for *FDI* are observed. So, that is a reason of high standard deviation value of *lnFDI*.

However, the result above shows the mean values of the GDP, FDI, MIN, MANU, CON and AGRI Variables are 22.51566, 19.25582, 7.443163, 20.46995, 5.517507 and 20.48497 respectively. The median of the series is 22.10825, 19.28146, 7.240717, 20.42621, 4.99568 and 20.27035 respectively for GDP, FDI, MIN, MANU, CON and AGRI variables. It should be noted that the median is a robust measure of the centre of the distribution that is less sensitive to outliers than the mean. The maximum values of each of the series in the current sample are 24.05709 for GDP, 21.48328 for FDI, 8.853149 for MIN, 21.33936 for MANU, 7.792113 for CON and 21.58923 for AGRI respectively. The standard deviations which are a measure of dispersion spread in each of the series are .844424 for GDP, 1.718198 for FDI, .7081627 for MIN, .5826195 for MANU, 1.462329 for CON and .648096 for AGRI. Additionally, the descriptive analysis was also furnished with Skewness and Kurtosis of all the variables of interest. The Skewness measures symmetrical property of the histogram while the kurtosis measures the height and the tail shape of the histogram. The yardstick for measuring the Skewness is how closer the variable is to the zero (0) and for the kurtosis is how closer the variable is to the three (3). Based on this, GDP, MIN, MANU, CON and AGRI has symmetrical distribution as opposed to FDI that have relatively asymmetrical distribution. For the kurtosis, all the variables (GDP, MIN, MANU, CON and AGRI) except FDI can be regarded as playkurtic because they have values less than 3. FDI is leptokurtic because its value is greater than 3 (12.19604).

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### 4.2 Unit Root Test Results – Graphical Method

#### 4.2.1 Gross Domestic Product

Gross domestic product for the period 1980 to 2016 is graphically presented in Figure 4.1. The graph is a case of a random walk with shift and time trend. A random walk shift and time trend in non-stationary. It contains a unit root. Therefore, Gross domestic product contains unit root. However, the first difference of Gross domestic product in Figure 4.2 is a case of a white noise. The first difference of gross domestic product therefore is of order I (1).

**Figure 4.1 GDP at level**

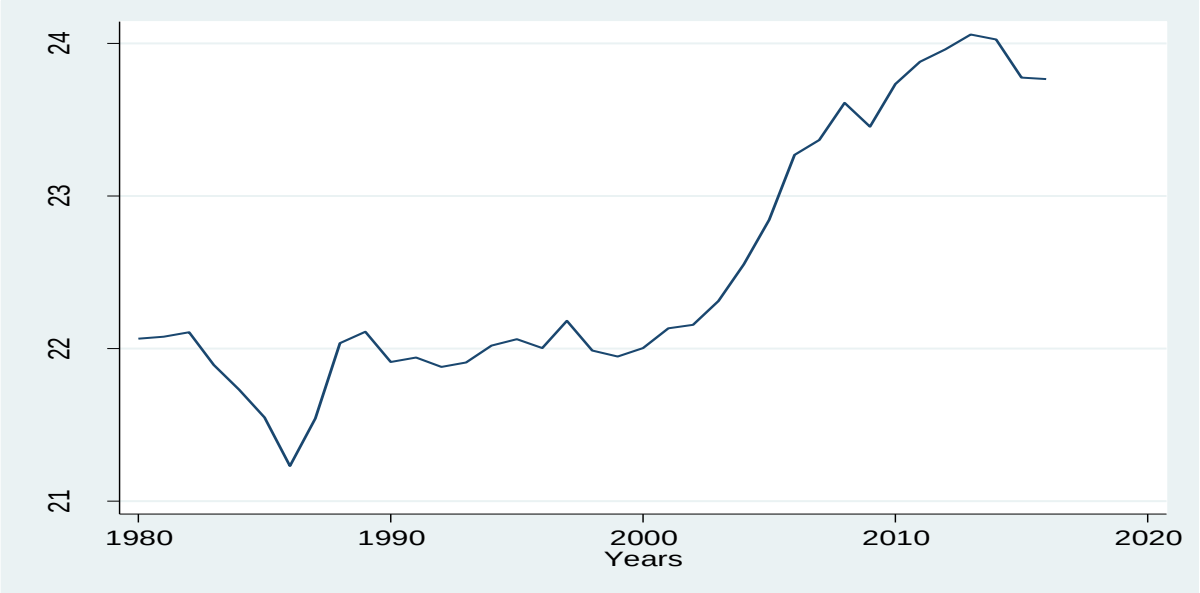
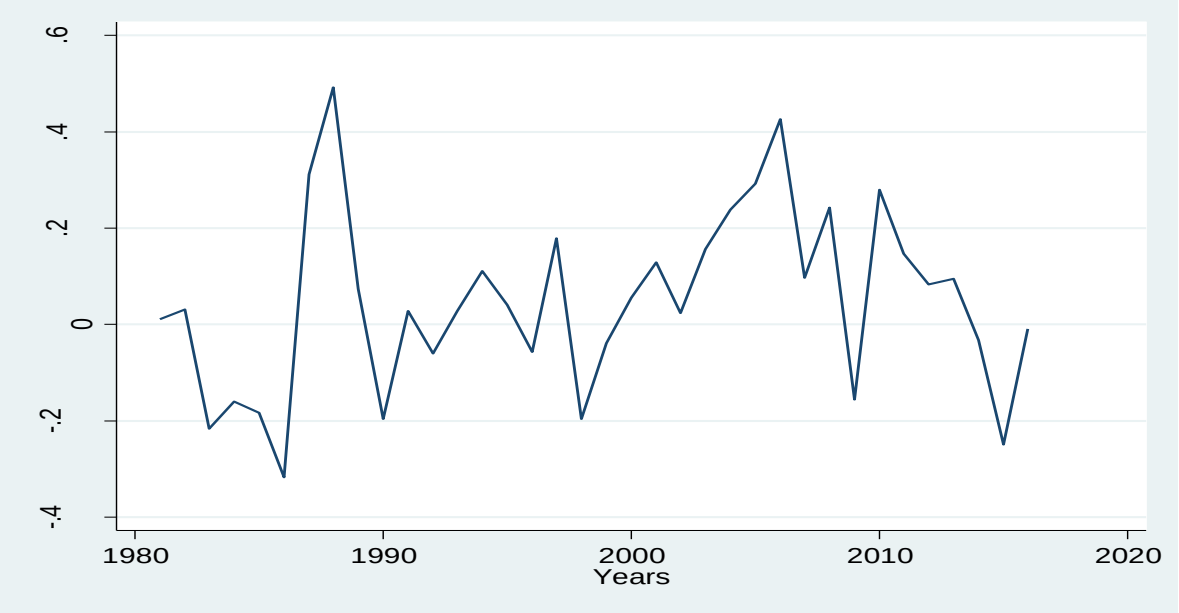



**Figure 4.2 GDP at First Difference**

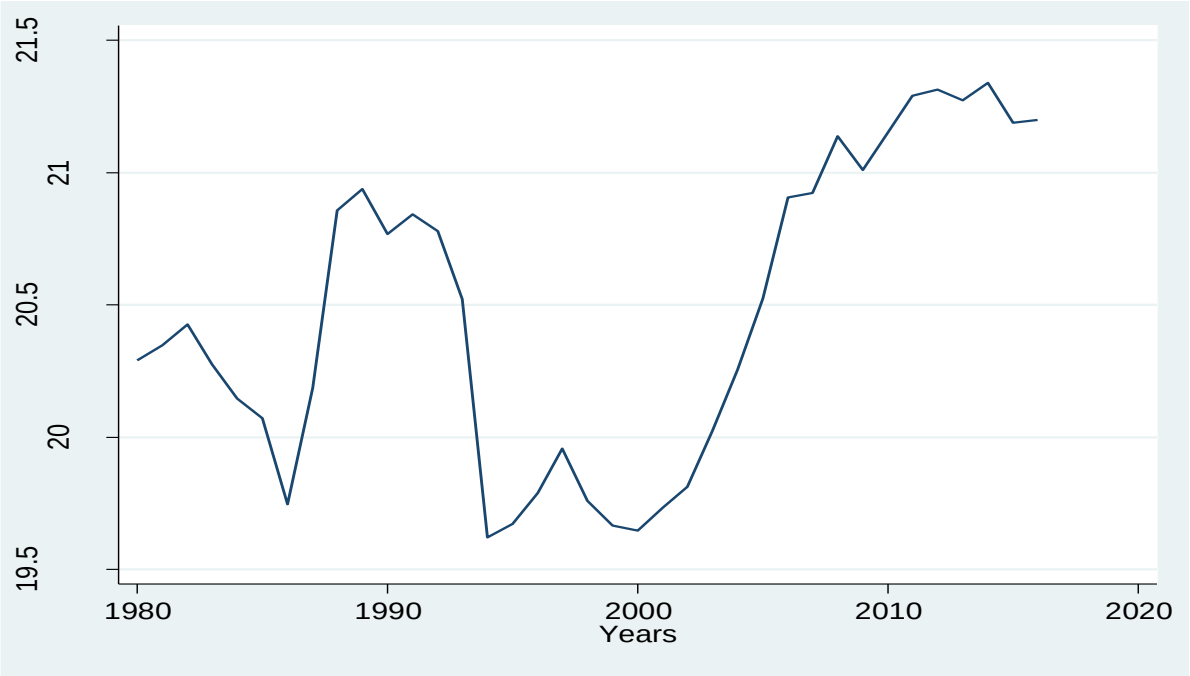



*Author's Analysis using STATA14*

### 4.3.2 Manufacturing

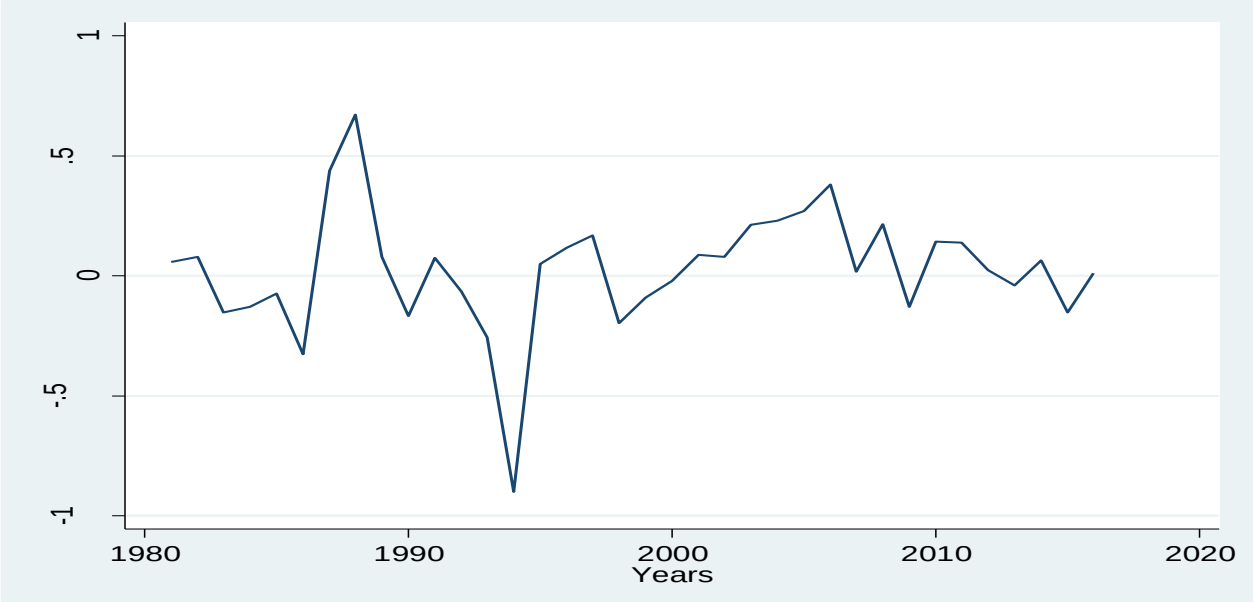
Manufacturing for the period 1980 to 2016 is graphically presented in Figure 4.3. The graph is a case of a random walk with trend. A random walk with trend is non-stationary. Therefore, Manufacturing contain unit root. However, the first difference of Manufacturing in Figure 4.4 is a case of a white noise and it is of order I (1).

**Figure 4. 1 Manufacturing at level**




*Author's Analysis using STATA14*

**Figure 4. 2 Manufacturing at First Difference**

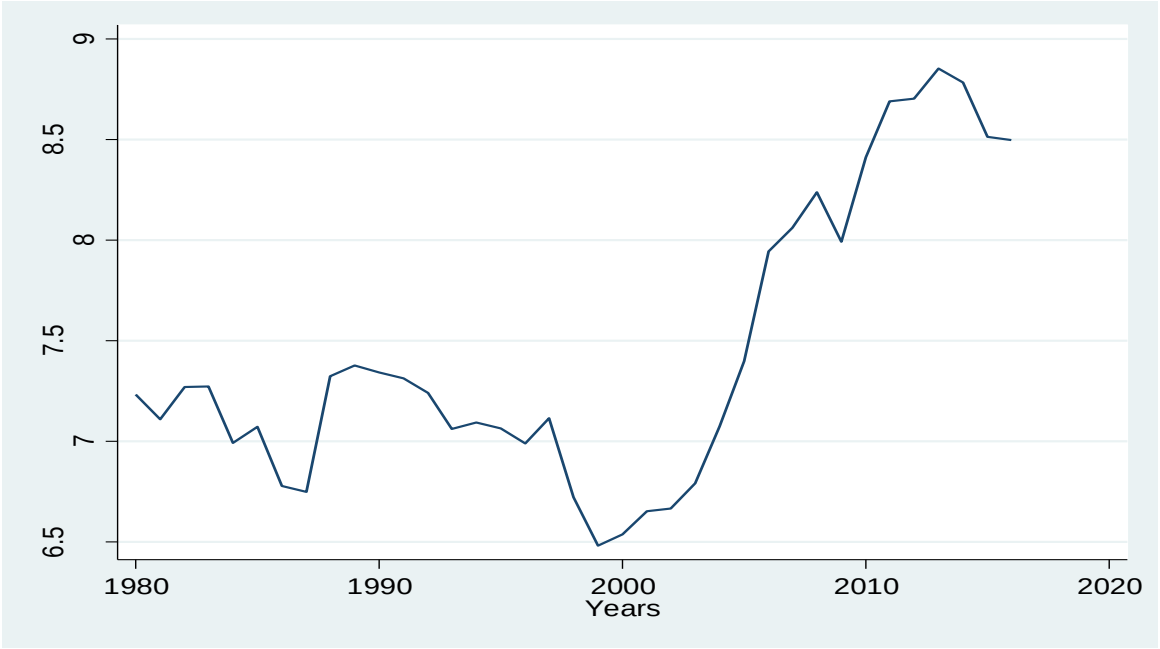



*Author's Analysis using STATA14*

### 4.3.3 Mining

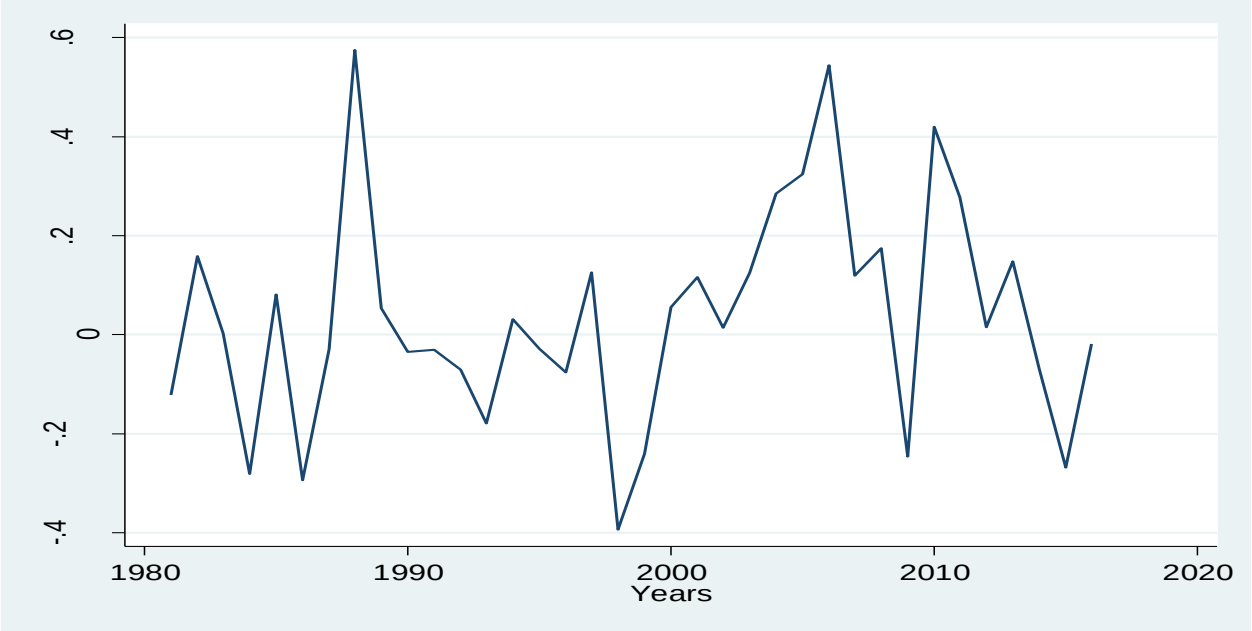
Mining for the period 1980 to 2016 is graphically presented in Figure 4.5. The graph is also a case of a random walk with shift and drifting upward. It is a random walk with shift and time trend in non-stationary. It contains a unit root. Mining therefore contain unit root. However, the second difference of Mining in Figure 4.6 is a case of a white noise. The second difference of mining therefore is of order I (1).

**Figure 4. 3 Mining at level**




*Author's Analysis using STATA14*

**Figure 4. 4 Mining at First Difference**




*Author's Analysis using STATA14*

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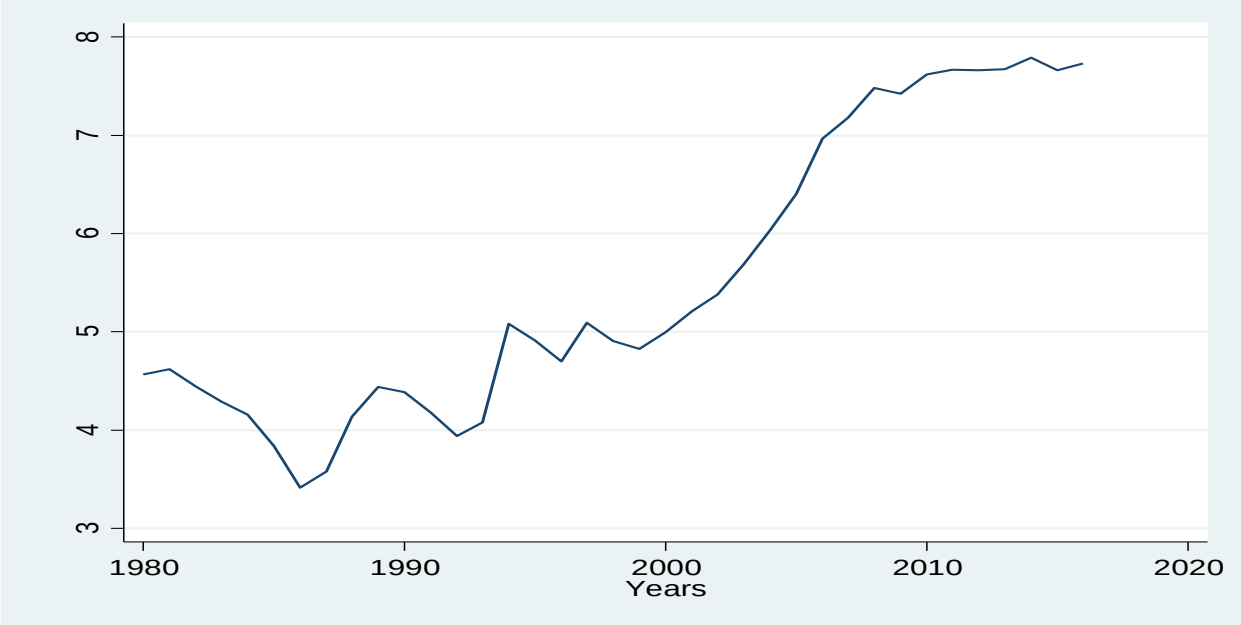
### 4.3.4 Construction

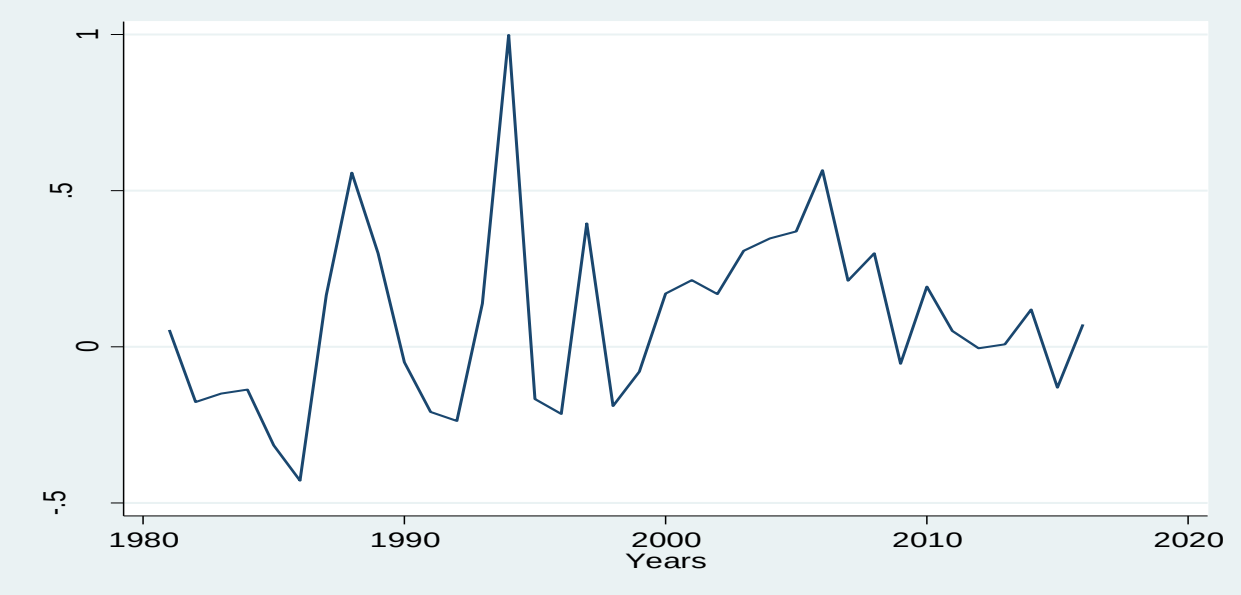
Construction for the period 1980 to 2016 is graphically presented in Figure 4.7. The graph is a case of a random walk with shift though drifting upward. A random walk shift and time drift is non-stationary. It contains a unit root. Therefore, Construction contain unit root. However, the first difference of inflation rate in Figure 4.8 is a case of a white noise. The first difference of construction therefore is of order I (1).

**Figure 4. 5 Construction at level**




*Author's Analysis using STATA14*

**Figure 4. 6 Construction at First Difference**

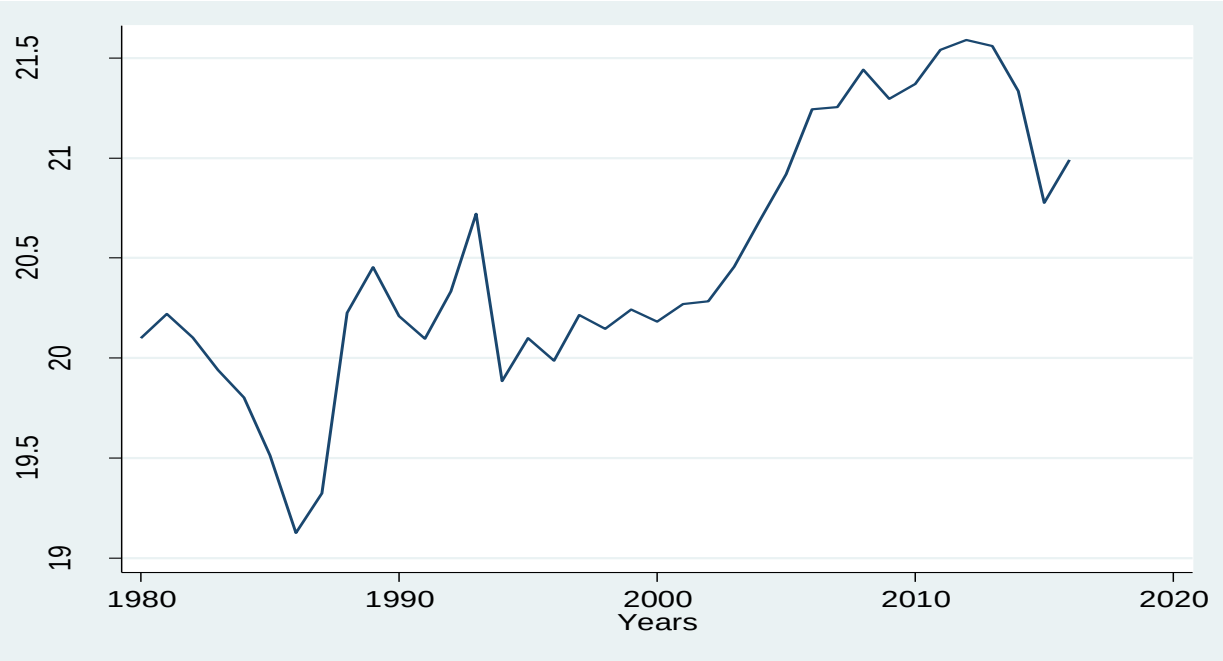



*Author's Analysis using STATA14*

### 4.3.5 Agriculture

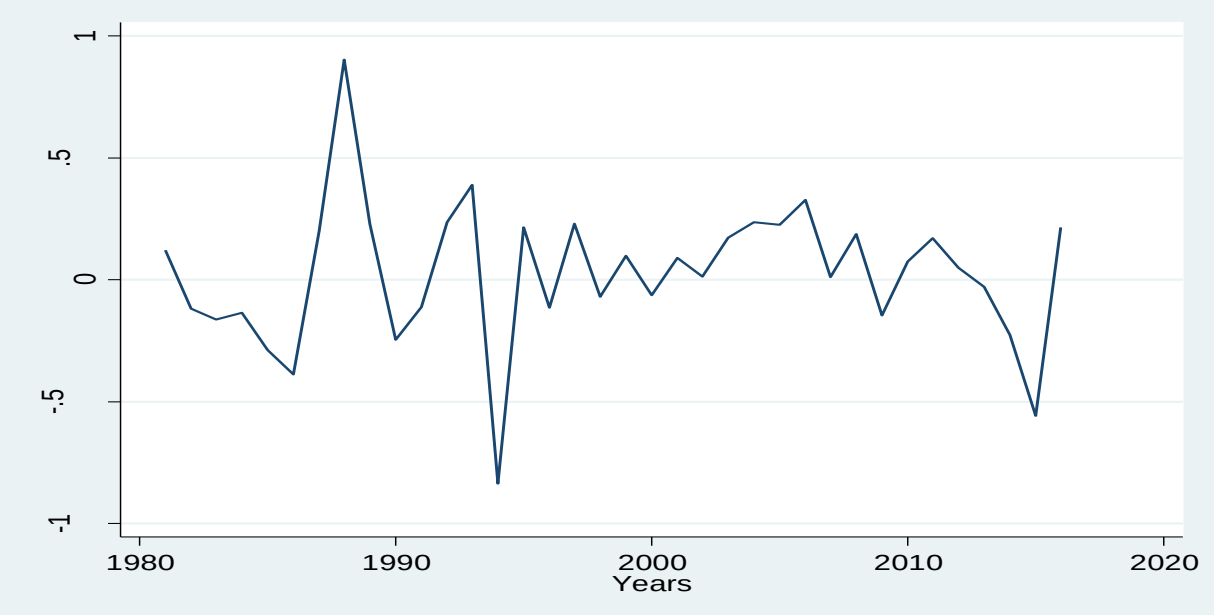
Agriculture for the period 1985 to 2017 has graphically presented in Figure 4.9 and the data is a case of a random walk with a shift and time trend. It implies that Agriculture contain unit roots. The first difference of Agriculture in Figure 4.10 however, is white noise and is of order I (1)

**Figure 4. 7 Agriculture at level**




*Author's Analysis using STATA14*

**Figure 4. 8 Agriculture at First Difference**




*Author's Analysis using STATA14*

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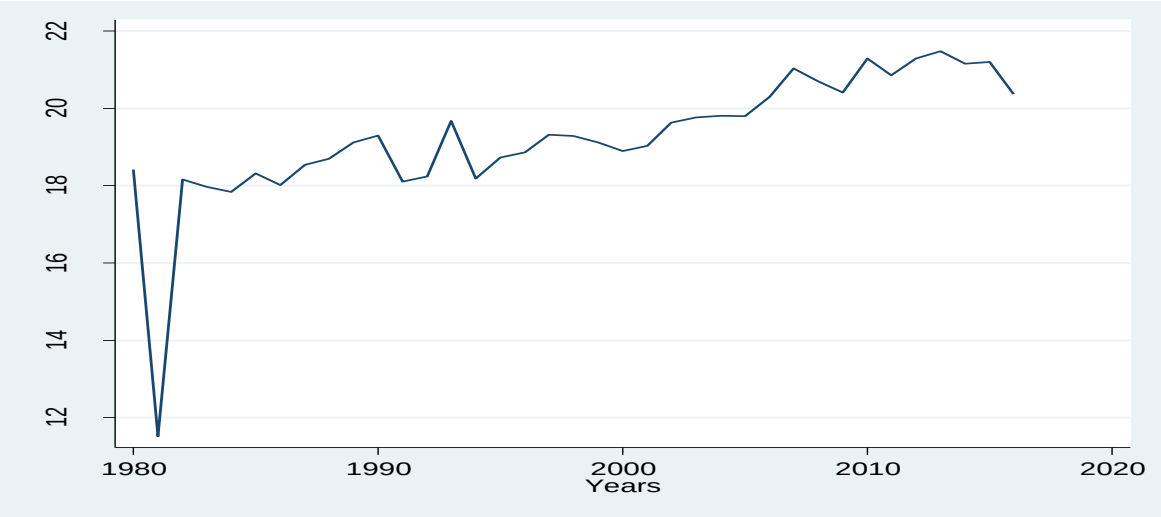
### 4.3.6 Foreign Direct Investment

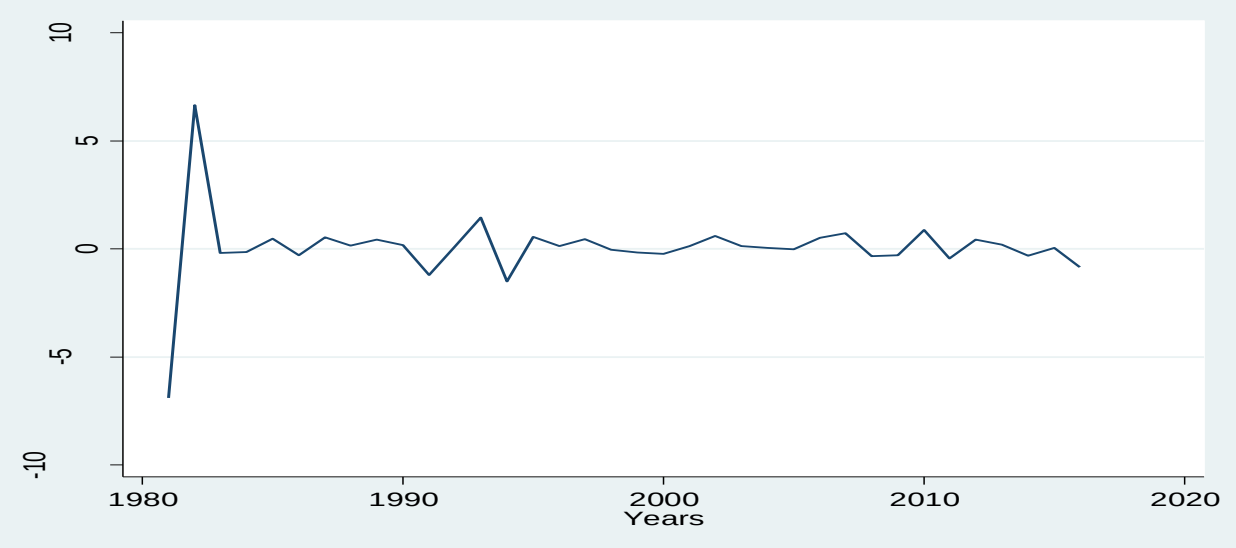
Foreign Direct Investmen is graphically presented in Figure 4.11 and is a case of a random walk with a shift and time trend. It implies that financial deepening contains unit roots. The first difference of financial deepening in Figure 4.12 however, is white noise and is of order I (1)

**Figure 4. 11 FDI at level**




*Author's Analysis using STATA14*

**Figure 4. 9 FDI at First Difference**




*Author's Analysis using STATA14*

#### *4.3.7 Summary of Graphical Method*

The graphical method of testing for unit root has reviewed that all the variables under study contains unit root at level during the study period of 1980 to 2016. The first difference of the variables under study are of order I (1). Since they are of same order, they can be only be tested for cointegration using a Johansen test but first intuitively comparison should be made with the mathematical tests (ADF & PP). The study applied a mathematical method called the Augmented Dickey Fuller and Phillip Perron Models to confirm the presence of unit roots.

**Unit Root Test Analysis Mathematically Method**

Before an estimation of the model is done, this study investigates the time series properties of gross domestic product (GDP), foreign direct investment (FDI), Mining Sector (MIN), Manufacturing Sector (Manu), Construction Sector (CON) and Agriculture Sector (AGRI). Non-stationarity is so problematic in the empirical analysis as such it needs to be looked after for it may end up giving misleading results. To estimate equation 1, a number of techniques were adopted that includes checking the stability properties of variables, two-unit root tests such as the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) were conducted. Bound co-integration test were also employed to test the long run relationship between the variables used in the model. The tables below show the results of unit root tests at level and difference.

**Table 4. 2 Augmented Dickey-Fuller (ADF) at level**

| Variable | Test Statistic | 5% Critical Value | P-Value | Decision |
|---|---|---|---|---|
| **Ln_RGDP** | -2.502 | -3.560 | 0.3268 | Non-Stationary |
| **Ln_FDI** | -8.292 | -3.560 | 0.0000 | Stationary |
| **Ln_MANU** | -2.077 | -3.560 | 0.5591 | Non-Stationary |
| **Ln_MIN** | -1.595 | -3.560 | 0.7943 | Non-Stationary |
| **Ln_CON** | -2.977 | -3.560 | 0.1386 | Non-Stationary |
| **Ln_AGRI** | -3.202 | -3.560 | 0.0840 | Non-Stationary |

*Sources: Researcher's compilation from STATA 14*

The null hypothesis is that the variables has unit root or are non-stationary while alternative is that the variables has no unit root or is stationary. The decision criteria are that, accept the null hypothesis if the absolute value of test statistic is lower the 5% critical value. Table 4.3 below shows the results of unit root test using Augmented Dickey-Fuller (ADF). The absolute values of the ADF *t* statistic in this case of Ln_RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI are all less than their 5% critical values as can be seen in the table so we should not reject the null hypothesis of the mentioned variables represents a random walk, or has a unit root. In other words, Ln_RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI series is not stationary at 5% level of significance. The MacKinnon approximate p-values of this test statistics is are all above percent. The variable Ln_FDI was found to be stationary at level as it be seen from the absolute test statistics of 8.292 is greater the 5% critical value of 3.560, so we reject the null hypothesis.

Table 4. 3 Augmented Dickey-Fuller (ADF) at First Difference

| *Variable* | *Test Statistic* | *5% Critical Value* | *P-Value* | *Decision* |
|---|---|---|---|---|
| ***Ln_RGDP*** | ***-3.560*** | ***-3.564*** | ***0.0334*** | ***Stationary*** |
| ***Ln_MANU*** | ***-3.910*** | ***-3.564*** | ***0.0117*** | ***Stationary*** |
| ***Ln_MIN*** | ***-3.560*** | ***-3.564*** | ***0.0334*** | ***Stationary*** |
| ***Ln_CON*** | ***-4.376*** | ***-3.564*** | ***0.0024*** | ***Stationary*** |
| ***Ln_AGRI*** | ***-4.401*** | ***-3.564*** | ***0.0022*** | ***Stationary*** |

*Sources: Researcher's compilation from STATA 14*

Table 4.4 documents the differenced variables of Ln_RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI. To achieve stationarity in the variables differential technique was effected on the variables, the absolute value

of test statistic of _RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI are higher than their respective 5% critical values, so we should reject the null hypothesis of random walk in variables.

Table 4. 4 Phillips-Perron (P-P) at level

| Variable | Test Statistic | 5% Critical Value | P-Value | Decision |
|---|---|---|---|---|
| **Ln_RGDP** | **-2.125** | **-3.556** | **0.5320** | **Non-Stationary** |
| **Ln_FDI** | **-7.217** | **-3.556** | **0.0000** | **Stationary** |
| **Ln_MANU** | **-1.700** | **-3.556** | **0.7511** | **Non-Stationary** |
| **Ln_MIN** | **-1.554** | **-3.556** | **0.8099** | **Non-Stationary** |
| **Ln_CON** | **-2.466** | **-3.556** | **0.3451** | **Non-Stationary** |
| **Ln_AGRI** | **-2.701** | **-3.556** | **0.2358** | **Non-Stationary** |

*Sources: Researcher's compilation from STATA 14*

The null hypothesis with Phillips-Perron is that the variables has unit root or are non-stationary while alternative is that the variables has no unit root or is stationary. The decision criteria are that, accept the null hypothesis if the absolute value of test statistic is lower the 5% critical value. Table 4.5 above shows the results of unit root test using Phillips-Perron (P-P) at level. The absolute values of the p-p *t* statistic in this case of Ln_RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI are all less than their 5% critical values as it can be seen in the table so we should not reject the null hypothesis of the mentioned variables represents a random walk, or has a unit root. In other words, Ln_RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI series is not stationary at 5% level of significance. The MacKinnon approximate p-values of this test statistics is are all above percent. The variable Ln_FDI was found to be stationary at level as it can be seen from the absolute test statistics of 8.292 is greater the 5% critical value of 3.560, so we reject the null hypothesis.

Table 4. 5 Phillips-Perron (P-P) at First Difference

| Variable | Test Statistic | 5% Critical Value | P-Value | Decision |
|---|---|---|---|---|
| **Ln_RGDP** | -4.335 | -3.560 | 0.0028 | Stationary |
| **Ln_MANU** | -4.345 | -3.560 | 0.0027 | Stationary |
| **Ln_MIN** | -4.807 | -3.560 | 0.0005 | Stationary |
| **Ln_CON** | -4.634 | -3.560 | 0.0009 | Stationary |
| **Ln_AGRI** | -5.469 | -3.560 | 0.0000 | Stationary |

*Sources: Researcher's compilation from STATA 14*

Table 4.6 documents the differenced variables of Ln_RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI. To achieve stationarity in the variables differential technique was effected on the variables, the absolute value of test statistic of _RGDP, Ln_MANU, Ln_MIN, Ln_CON and Ln_AGRI are higher than their respective 5% critical values, so we should reject the null hypothesis of random walk in variables. It was found that from both ADF test and P-P test variables were found to stationary at different levels such as at level and first difference.

### 4.3 Optimal lags

Next step towards the ECM model, the co-integration testing technique requires suitable lag length of all variables. Best model has different lag length of each variable. Lütkepohl, (2006) found that dynamic link among the series can be captured if proper lags are used. The optimal lags should be chosen by the model itself. I used STATA 14 for selecting optimal lags for each variable according to the smallest AIC (Akaike information criterion), HQIC and SBIC values. Table 4.7 shows the optimal lags for all variables.

**Table 4. 6 Lag Selection**

| VARIABLES | INDIVIDUAL OPTIMAL LAG |
|---|---|
| Gross Domestic Product | 4 |
| Manufacturing | 1 |
| Mining | 0 |
| Construction | 4 |
| Agriculture | 3 |
| Foreign Direct Investment | 4 |

### 4.4 Bound Co-integration test

This study used the bounds co-integration test to ascertain for co-integration among the variables. The test has two forms, namely, the Wald F statistic test and the t statistic. The test was arrived at for the fact that variables were stationary at different levels as evidenced by Augmented Dickey-Fuller and Phillips-Perron tests, the appropriate test in this case was bound test of co-integration the tests was used to determine if the variables are cointegration exist. The null hypothesis for the Wald F statistic shows that there are no co-integrating vectors present while the alternative hypothesis confirmed that there is co-integrating vector present.

**Table 4. 7 Bound Co-integration Test Results**

**Pesaran/Shin/Smith (2001) ARDL Bounds Test**

H0: no levels relationship F = 23.935
t = -8.728

Critical Values (0.1-0.01), **F-statistic**, Case 3

| | [I_0] L_1 | [I_1] L_1 | [I_0] L_05 | [I_1] L_05 | [I_0] L_025 | [I_1] L_025 | [I_0] L_01 | [I_1] L_01 |
|---|---|---|---|---|---|---|---|---|
| k_5 | 2.26 | 3.35 | 2.62 | 3.79 | 2.96 | 4.18 | 3.41 | 4.68 |

accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

*Sources: Researcher's compilation using STATA 14*

The co-integration test results in Table 4.8 indicate the existence of long run relationship between the dependent variable (Real Gross Domestic Product) and independent variables (Foreign Direct Investment, Mining Sector, Manufacturing Sector, Construction Sector and Agriculture Sector) in Zambia as indicated by the F-statistics. The results show that the F value is higher than I(0) and I(1) and the decision criteria is that if the value of F statistic is lower than I(0) then you accept the null hypothesis of no level relationship and when the F statistic is higher the I(1) you reject the null hypothesis and conclude that the variables are co-integrated at the 0.05 percent level.

### 4.6 Long-Run Results

The research used Stata 14 to obtain the long run estimation (Table 4.9). According to the estimated coefficients, the FDI has a positive and significant impact on the GDP of Zambia in the long run. This result is consistent with the endogenous theory and Innovation-based growth model, whereas it doesn't support the Dependency theory arguments in case of Zambia. Both theories show that the FDI boosts the economy growth through new technology progress, enhances knowledge, consistency in investment and technological spillover. Thus, economic growth increases continuously over time. Bende –Nebende, A., Ford, J., Santoso B., S Sen, S (2003) found a positive and significant impact on the economic growth. They also found that FDI have more positive

impact on developing as compared to developed countries. Mohey-ud-din, Ghulam (2004) also found strong positive impact of FDI on economic growth of developing countries.

The positive coefficient for mining of approximately .4707738 indicates that the mining sector has a strongly positive and significant impact on economic growth. It can be deduced that in the long run, if FDI is attracted in the mining sector should increase by a unit; it will cause economic growth to increase by approximately 0.4707738 percent on average ceteris paribus at 5 percent level.

Similarly, the positive coefficient for construction of approximately .2298993 indicates that the construction sector has a strongly positive and significant impact on economic growth. It can be deduced that in the long run, if FDI is attracted in the construction sector should cause economic growth to increase by approximately .2298993 percent on average ceteris paribus at 5 percent level.

The positive coefficient for Agriculture of approximately .271419 indicates that the agriculture sector has a strongly positive and significant impact on economic growth. It can be deduced also that in the long run, if FDI is attracted in the mining sector should increase by a unit; it will cause economic growth to increase by approximately .271419 percent on average ceteris paribus at 5 percent level.

On the other hand, the negative coefficient for manufacturing of approximately -.1727209 indicates that the manufacture sector has a negative and significant impact on economic growth. It can be deduced that in the long run, if FDI is attracted in the manufacturing sector and not well allocated, will cause economic growth to decrease by approximately 0.1727209 percent on average ceteris paribus at 5 percent level.

In conclusion, from the long run estimates the study can now test the hypotheses as discussed in the discussion of the results.

**Table 4. 8 Long-run estimates**

Dependent variable: LRGDP

Estimates of the Long Run (ECM) equation (1980-2016)

| Variables | Coef. | Std. Err | z | P>z |
|---|---|---|---|---|
| Ln_MANU | -.1727209 | .0453618 | -3.81 | 0.003 |
| Ln_MIN | .4707738 | .0476327 | 9.88 | 0.000 |
| Ln_CON | .2298993 | .0397805 | 5.78 | 0.000 |
| Ln_AGRI | .271419 | .0686781 | 3.95 | 0.002 |
| Ln_FDI | .1079863 | .0519836 | 2.08 | 0.054 |
| _cons | 12.15616 | 2.067108 | 5.88 | 0.000 |
| Number of obs = 33 | R-squared = 0.9933 | | Adj R-squared = 0.9806 | |
| Log likelihood = 90.937797 | | Root MSE = 0.0266 | | |

*Sources: Researcher's compilation using STATA 14*

From the above results, albeit very high R-squared ($R^2$), sectorial FDI was found to significantly and positively affect sectorial GDP in the Zambia data (at 5% as P>|z|<0.05). The coefficient shows that for every percent change in FDI is associated with .01079863 percent increase in GDP on average ceteris paribus at 5% level.

Adjusted r-squared of over 98% implies that variations in sectorial GDP are as a result of movements in sectorial FDI. As the p-values are less than 0.05 the results conclude that all sectors are significant, meaning effects of sectorial FDI to sectorial GDP is strong in all sectors, however intercepts vary.

### 4.5 Short run analysis

**The Short Run (ARDL-EC) mode:** The short run dynamic results are provided under the Error Correction Model as shown in table 4.10.

**Table 4. 9 Short-run estimates**
**Dependent variable: LRGDP**
**Estimates of the Short Run (ARDL-EC) equation (1980-2016)**

| Variables | Coef. | Std. Err | z | P>z |
|---|---|---|---|---|
| ECM (-1) | -.8909777 | .1020815 | -8.73 | 0.000 |
| Ln_RGDP | | | | |
| LD. | -.0131547 | .1347256 | -0.10 | 0.924 |
| L2D. | .3097728 | .1678959 | 1.85 | 0.092 |
| L3D. | .1944195 | .0975139 | 1.99 | 0.072 |
| Ln_MANU | | | | |
| D1. | .2836993 | .0613111 | 4.63 | 0.001 |
| Ln_CON | | | | |
| D1. | .0726544 | .0572302 | 1.27 | 0.230 |
| LD. | -.0799318 | .0702537 | -1.14 | 0.279 |
| L2D. | -.1771483 | .0764952 | -2.32 | 0.041 |
| L3D. | -.1389377 | .0474913 | -2.93 | 0.014 |
| Ln_AGRI | | | | |
| D1. | -.0636955 | .0614404 | -1.04 | 0.322 |
| LD. | .0201714 | .0720221 | 0.28 | 0.785 |
| L2D. | -.1361394 | .0552737 | -2.46 | 0.032 |
| Ln_FDI | | | | |
| D1. | -.1021749 | .0319448 | -3.20 | 0.008 |
| LD. | -.0984523 | .0227563 | -4.33 | 0.001 |
| L2D. | -.0233569 | .0126431 | -1.85 | 0.092 |
| L3D. | -.0136297 | .0069525 | -1.96 | 0.076 |
| _cons | 12.15616 | 2.067108 | 5.88 | 0.000 |
| Number of obs = 33 | | | R-squared = | 0.9933 |
| | | | Adj R-squared = | 0.9806 |
| Log likelihood = 90.937797 | | | Root MSE = | 0.0266 |

*Sources: Researcher's compilation using STATA 14*

The results showed that adjustment term ECM was significant and the coefficient was negative which validated the assumption of co-integration in the variables under consideration. Further, the results showed that the sign for the error correction term was negative and that the term was between 0 and -1. The error correction term of -.8909777 implied that, according to this model, whenever there was any deviation from the static equilibrium, the deviation had to be corrected at a rate of about 89.097 percent. (Notice that, the larger the magnitude of the error correction term coefficient is, the faster the speed of adjustment towards the equilibrium).

From the short run estimates, the percentage point change in the first and second lag of FDI is associated with -0.09845 and -0.0136 respectively percentage point decrease in the economic growth on average ceteris paribus at 5% significant level.

And in the short run the percentage point change in the second lag of Agriculture is associated with -.1361394 percentage point decrease in the economic growth on average ceteris paribus at 5% significant level.

Also, in the short run the percentage point change in the second lag of Manufacturing is associated with .2836993 percentage point increase in the economic growth on average ceteris paribus at 5% significant level. The results indicate of manufacturing sector have positive and significant impact on economic growth.

From the short run estimates, the percentage point change in the second and third lag of construction is associated with -.1771483 and -.1389377 respectively percentage point decrease in the economic growth on average ceteris paribus at 5% significant level.

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### 4.7 Diagnostic checks for the ARDL-EC Model

The diagnostic checks are very important to the model because they validate the parameter evaluation outcomes achieved by the estimated model. This arises because, if there is a problem in the residuals from the estimated model; it is an indication that the model is not efficient such that parameter estimates from the model may be biased.

The ARDL-ECM model was tested for normality using histogram, jarque-bera, skewness and kurtosis test, serial correlation using the langrage multiplier (LM) test and heteroskedesticity using the White test. The tables (4.11 & 4.12) and figure 4.15 that follows represents the diagnostic tests results and they all reveal the suitability of the model hence the results from this research can be relied on.

Table 4.12 presents the diagnostic tests results and they all reveal the suitability of the model hence the results from this research can be relied on.

The residuals are normally distributed as indicated by the histogram below, this leads to the acceptance of the null hypothesis that the residuals were normally distributed.

**Figure 4. 10 Histogram - Normality Test**

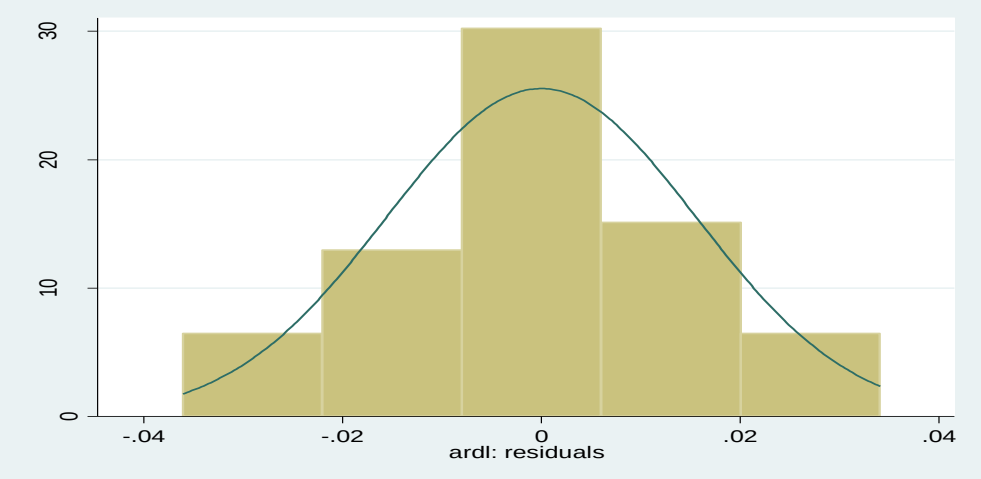


**Table 4. 10 Skewness/Kurtosis tests for Normality**

| Variable | Obs | Pr (Skewness) | Pr(Kurtosis) | adj chi2(2) | Prob>chi2 |
|---|---|---|---|---|---|
| MyResiduals | 33 | 0.8362 | 0.6861 | 0.21 | 0.9021 |

The null hypothesis is that the residuals are normally distributed; Ho: Normally distributed.

The probability value is greater than 0.05 level of significance. According to Gujarati (2004), we therefore do not reject the null hypothesis of normality. They are normally distributed implying compliance with the desirable properties of ordinary least squares.

**Table 4.12 Diagnostic Checks Analysis**

| **Test for** | **Test** | **p-value** | **Conclusion** |
|---|---|---|---|
| Breuch-Godfrey Serial correlation | LM | 0.0662 | Accept $H_0$ |
| | ARCH LM | 0.8202 | Accept $H_0$ |
| Normality | JB | 0.9815 | Accept $H_0$ |
| Heteroskedasticity | White (no cross) | 0.7260 | Accept $H_0$ |

### 4.8 Discussion of Results

**Introduction**

The main objective of this research paper was to evaluate the effect of sector FDI on economic growth in Zambia. In pursuit of evaluating the above, hypotheses were proposed in Chapter 1. This sub chapter discusses the results presented earlier in this same chapter in more detail. The empirical findings of this research using time series data estimation techniques in order to test the hypothesis were linked to previous studies and literature. In setting the discussion scene, general observations with regards to major themes of this research gained from the data analysis will be presented. Thereafter, results specific to each economic sector will be examined in so far as they served to test hypotheses.

**Key observations**

As was discussed, this research had five hypotheses. The hypothesis was addressed from two angles, firstly it was important to analyse the impact of total FDI accumulation into the specific sector's economic growth as measured by sector GDP and secondly to measure the impact of a particular economic sectors' FDI accumulation to total economic growth as measured by total GDP. These two perspectives were set to give a much more consolidated view of which economic sectors have significant impact on GDP growth as a measure of FDI driven economic growth in developing countries.

The results of this study show that there is statistically significant evidence that sectorial FDI, results in sector economic growth in Zambia. The ARDL Error Correctional Model analysis as depicted in Table 4.9, details that a percent change in FDI injection into an economic sector results in .1079863 percent increase in sector GDP as in the long run. These results are favourable since the main objective of developing governments in attracting FDI is to accelerate economic growth Kolstad (2011). It is important to note that these results are in line with the results produced by Özkan-Günay (2011), Kolstad (2011), Madem, Cudla & Rao (2012) who argued that FDI results in economic growth in developing countries as measured by GDP. Although the results showed statistically significant evidence that sectorial FDI results in sector economic growth, further analysis using the OLS regression model detailed in Table 4.10 showed that intercepts vary. This means that given FDI, some economic sectors contribute more than others to economic growth. This will be discussed in greater depth below when analyzing the individual economic sectors.

Although the above results are interesting, they are narrowly focused in the sense that they measure sector economic growth given FDI injection in a particular sector. The research also analysed a more interesting and broader dynamic in the long run where sector FDI is measured against its contribution to the overall economic growth as measured by total GDP. The results of the statistics using ECM analysis shown in Table 4.9 conclude that on the whole, FDI has positive impact on economic growth as measured by total GDP. The result rejects the null hypothesis in chapter one and accept the alternative hypothesis showing enough evidence that Increased FDI inflow does increase economic performance in Zambia. However, the Error Correction model which inquired into the separate effects of each economic sector to total GDP shows that economic sectors such as manufacturing have negative statistical significance evidence that they contribute to economic growth. On the other hand, some sectors have positive statistically significant evidence that they contribute to economic growth and these sectors are:

Mining and quarrying, Agriculture and Construction

These results are in line with Kennedy, Bardy & Rubens (2012) research which acknowledged that different sector's FDI have variable impact on economic development and such if FDI is to result in accelerated economic growth, priority should be directed to investments in industries that have been identified to have a greater impact on economic growth.

The results of this study's model show that different economic sector's FDI has varying impacts on economic growth as measured by sectorial GDP. To this extent the Null Hypothesis $H_0$ is accepted. When analyzing the effect of sectorial FDI to sectorial GDP, the data as per Table 4.9 & 4.10 the long run and short

run results respectively estimates showed that intercepts differ across sectors using the ECM regression models. These results were expected and are in line to the results presented by Kennedy, Bardy & Rubens (2012) who also argued that FDI in different economic sectors have different impact on economic growth. Further the results are also in line with Inekwe (2013) and Imoudu (2012) who utilized the co-integration method using the case of Nigeria to measure the differences in economic sectors' FDI contribution to economic growth. The convergence of the conclusions despite using different statistical methods confers greater confidence in the robustness of the conclusion that there are differences in economic sectors contribution to economic growth.

**4.8.1 Manufacturing**

The ARDL-EC model results as per Table 4.9 revealed that there is significant statistical evidence that FDI in the manufacturing sector in Zambia has had a negative impact on economic growth. These empirical results are disappointing considering that theoretical explanation points towards the assertion that increased FDI in manufacturing should result in economic growth (Elhiraika, Aboubakar & Muhammad, 2014). There is however consistency in this outcome with parallel empirical evidence produced by Inekwe (2013) who through the application of vector error correction methodology and Johansen's cointegration technique on the Nigerian data showed that FDI in the manufacturing sector has a negative association with economic growth.

One of the potential reasons for this outcome is the fact that according to Amighini, Rabellotti & Sanfilippo (2013) the natural resource-seeking motive in medium to high income developing countries, within which Zambia is classified, tends to be in the manufacturing sector.

This means that most FDI injected in the manufacturing sector in Zambia is not motivated by efficiency-seeking and thus the manufacturing sector fails to take advantage of economies of scale and scope as they prefer to only meet the basic minimum of beneficiation required by legislation.

Further to the above, Yanling (2010) argues that most developing countries lack absorptive capacity to take advantage of FDI as an enabler for accelerating economic development due to lack of proper infrastructure and strong technological base. In addition, even if the South African manufacturing sector may have a good absorptive capacity, foreign investments that are too technologically advanced for developing countries may create non absorbable spillovers (Yanling, 2010). According to Damijan, Rojec, Majcen, & Knell (2013) from a microeconomic point of view, there should be a positive spillover effect to the indigenous firms if FDI is to result in economic growth.

**4.8.2 Mining and quarrying**

The ARDL-EC model results detailed in Table 4.9 show that the mining and quarrying industry has notable impact on economic growth in Zambia. The result rejected the null hypothesis in chapter one and accept the alternative hypothesis showing enough evidence that mining does positive significantly impact Economic Growth in Zambia. These results are in contradiction to the results produced by Imoudu (2012) who employed the Johansen's co-integration technique to reveal that FDI in mining and petroleum sectors in Nigeria have had little impact on economic growth. One of the reasons why there could be differences in the results is the fact that the two countries may have different absorptive capacity built from past infrastructure which according to Yanling (2010) most developing countries lack. Barclay (2010) presented insight that the Jamaican bauxite mining industry has had a positive impact on the economic development because bifurcated bureaucracies were well funded and embedded within both local and foreign firms by the Jamaican government.

The results of this current study affirm assertions made by Barclay (2010) that the mining industry positive externalities occur when host country policymakers implement policies that increase indigenous technological capability. The Citizen Economic Empowerment

(CEEC) programme implemented by the government of Zambia arguably increased indigenous

technological capability thereby enhancing the absorptive capacity of the Zambia mining industry to capture the spillovers arising from the foreign companies' activities.

Another important factor that explains why mining and quarrying in Zambia has had a statistically significant impact on economic growth, relates to comments made by Noland, Park & Estrada (2012) who assumed that FDI in labour intensive industries was likely to result in economic growth and poverty reduction. Although their data was based on the manufacturing and services sectors in Asian countries the point was made that the less automated the sector, the more labour intensive the sector was likely to be. This scenario was shown to result in statistical evidence that growth in labour intense industries associated well with improved economic development and helped to explain the Zambia mining sector results in this research.

**4.8.3 Agriculture**

The findings showed that the agriculture sector was significant in its impact on economic growth as measured by total GDP. The result rejected the null hypothesis (IV) in chapter one and accept the alternative hypothesis showing enough evidence that agriculture does positive significantly impact Economic Growth in Zambia. These results are in line with empirical outcomes from Chaudhuri and Banerjee (2010) who analysed the impact of greenfield FDI on agricultural land in a developing economy and concluded that increased FDI in the agricultural sector improves unemployment of both unskilled and skilled labour as well as national welfare as measured by GDP. However, the results differ to those presented by Imoudu (2012) who used the co-integration method to assess sectorial FDI in Nigeria for the period between 1980 and 2009. That study showed that FDI in the agriculture sector among others has little impact on economic growth. One of the potential explanations to the differences in these results alluded to by Imoudu (2012) is the need to overhaul the economic sector and the creation of an enabling investment climate that channels FDI into the most productive aspects of the agricultural sector in Nigeria.

**4.8.4 Construction**

The construction industry has had the advantage of enhancing the absorptive capacity of developing countries to take advantage of FDI as an enabler to accelerate economic wellbeing through infrastructure development Yanling (2010). The findings reject the null hypothesis in chapter one and accept the alternative hypothesis showing enough evidence that construction does positive significantly impact Economic Growth in Zambia. In this regard the construction industry fulfills dual roles, firstly as an industry that provides necessities (goods and services) and more importantly as an enabler of future growth by improving the country's absorptive capacity. In terms of government services, the above results are aligned to Madem, Cudla & Rao (2012) argument noting that sectors with high government support tend to receive a good share of FDI inflow and have a better absorptive capacity which ultimately results in positive economic growth. This is because government has the ability to build infrastructure and institutions thus intensifying absorptive capacity.

**4.9 Conclusion**

In conclusion, the study found that sectorial FDI has varying impacts on economic growth as measured by GDP. This means that there are bound to be contradictory results among various researchers as they may focus on different economic sectors and FDI forms. The results of this research therefore support Kennedy, Bardy & Rubens (2012) argument that different industries have different impact on economic growth and thus priority should be directed towards investment into economic sectors that have the greatest impact on economic development if developing countries are to benefit from FDI.

## CONCLUSION AND RECOMMENDATION

The results of this research confirmed that there have been sectorial differences in the effect of FDI on economic growth. These assertions were based on the fact that the EC model results showed that intercepts of sectorial FDI impact to economic growth as measured by GDP vary.

The major findings based on the research objective, which was to determine the effect of sectorial FDI on

economic growth as measured by GDP in Zambia. The following sub-section highlight the main findings of this research based on the research objective identified for this research.

**Impact of sectorial FDI on economic growth**

The results of this research established that sectorial FDI has different impacts on economic growth as measured by GDP contribution. This means that given FDI, some economic sectors have the propensity to contribute more than others towards economic growth. The results of this research established that FDI in mining, construction and agriculture industry has the highest impact on economic growth as measured by GDP. One of the potential reasons of this outcome established from literature is that the injection of FDI into the mining, construction and agriculture industry has great positive spillovers into other industries. Bălan & Bălan (2011) note that the development of new means of communication, information technology and transport is an important factor for increasing mobility of skills, goods and services which result in improved economic activities in a number of sectors which ultimately results in economic growth.

**Recommendations to stakeholders**

In the light of the empirical findings, which emerged in this study, the following recommendations are made.

**Governments and policymakers**

As discussed, one of the key priorities of developing governments is poverty alleviation through economic growth. It was established in the literature review that FDI inflows are an important external source of financing for economic growth and are a more stable and beneficial capital injection substitute to financial aid in developing country contexts. The recommendations that follow are meant to ensure that FDI injections positively and effectively impact economic growth so that FDI is beneficial to the host country.

Firstly, the research established that sectorial FDI has variable impacts on economic growth and thus FDI should be channeled to economic sectors that have a greater impact on economic growth. FDI in the mining, construction and agriculture industry has the greatest impact on economic growth and thus governments and policymakers should encourage more FDI injection into this industry in order to accelerate FDI driven economic growth. Further, policies that encourage FDI inflows into wholesale, retail; catering and accommodation industry, tourism, electricity, gas, water, government services industry should be promoted as FDI into these industries may have potential for a positive impact on economic growth.

**Social entrepreneurs**

For social entrepreneurs and socially motivated investors that are motivated by both economic profit and positively contributing to national welfare and poverty alleviation, this research suggests that they should prioritise investing in the mining, construction and agriculture industry. This industry has been shown to have the greatest impact on economic growth and thus their investments would likely result in improved national welfare and poverty alleviation.

**Academics and researchers**

This research paper contributes to existing literature by explaining possible differences in research results that have shown contradictory results. It is recommended that researchers should acknowledge that different economic sectors FDI have different impact on economic growth.

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## REFERENCES

[1] Alam, A., & Shah, S. (2013). *Determinants of foreign direct investment in OECD member* countries. Journal of Economic Studies, 40(4), 515-527. doi:10.1108/JES-10-2011-0132

[2] Alfaro, L. (2003). Foreign direct investment and growth: Does the sector matter. Harvard Business School, 1-31.

[3] Adelegan, J.O. (2000), "Foreign direct investment and economic growth in Nigeria: A seemingly unrelated model". *African Review of M oney, Finance and Banking, Supplementary issue of "Savings and development*" 2000. pp.5–25. Milan, Italy.

[4] Akinola, A.E. (2004), "Foreign direct investment and growth in Nigeria: *A empirical investigation" Journal of Policy Modeling*, vol. 26 No. 3 pp. 627- 39

[5] Balasubramanyam, V.N., M.A. Salisu and D. Sapsford (1996), "*Foreign direct investment and growth in EP and IS countries*". Economic J., 106(434): 92-105.

[6] Barro, R. and J. W. Lee. (1994), "International comparison of educational attainment". *Journal of Monetary Economics*, 32(3): 361–94.

[7] Blonigen, B. and M. Wang (2005), "*Inappropriate Pooling of Wealthy and Poor Countries in Empirical FDI Studies*". In: Moran, T.H., E. Graham and M.

[8] Blomstrom (Eds.), Does Foreign Direct Investment Promote Development? Institute of International Economics Press, Washington, D.C.

[9] Borensztein, E., J. Gregorio and J. Lee (1998), "*How does foreign direct investment affect economic growth*?" J. Inter. Econ., 45(1): 115-135.

[10] Brown, C.V. (1962), "*External economies and economic development*". The Nigerian Journal of Economic and Social Studies, 4(1): 16–22.

[11] Cerra, V., Rishi, M., & Saxena, S. C. (2008). Robbing the Riches: *Capital Flight, Institutions and Debt*. Journal Of Development Studies, 44(8), 1190-1213. doi:10.1080/00220380802242453

[12] Chackochen, M. M., & Ramalingam, P. (2012). FDI Investment: Retail Franchising. *SCMS Journal Of Indian Management*, *9*(2), 26-30.

[13] Ching-Mu, C., Melachroinos, K. A., & Chang, K. (2010). *FDI and Local Economic Development*: The Case of Taiwanese Investment in Kunshan. European Planning Studies, 18(2), 213-238. doi:10.1080/09654310903491564

[14] Creswell, J. W. (n.d). Research design: Qualitative, Quantitative, and Mixed methods approaches. In SAGE Publications.

[15] De Mello, L.R., (1997), "*Foreign direct investment in developing countries and growth: A selective survey*". J. Dev. Stud., 34: 1-34.

[16] Deb S.G. and Mukherjee J. (2008), *Does Stock Market Development Cause Economic Growth*?, Time Series Analysis for Indian Economy. International Research Journal of Finance and Economics, 21, 142-149.

[17] Doytch, N., & Eren, M. (2012). Institutional Determinants of Sectorial FDI in Eastern European and Central Asian Countries: The Role of Investment Climate and Democracy. *Emerging Markets Finance & Trade*, *48*14-32.

[18] Elhiraika, A. B., Aboubakar, O., & Muhammad, K. (2014*). Promoting manufacturing to accelerate economic growth and reduce growth volatility in Africa*. *Journal Of Developing Areas*, *48*(2), 1-20 [22].

[19] Egbo, Macaulay D (Nil), *Foreign Direct Investment and The Performance*, Proceedings of the 1st International Technology, Education And Environment Conference; African Society For Scientific Research (Assr). Email: endmac@yahoo.com

[20] Egwaikhide Christian Imoudu (2012), *The Impact of Foreign Direct Investment on Nigeria"s Economic Growth; 1980-2009*: Evidence from the Johansen"s Cointegration Approach" International Journal of Business and Social Science Vol. 3 No. 6

[21] Games, D (2012) Doing Business in Africa: Corporate Insights. Penguin Books: South Africa.

[22] Gohou, G., & Soumaré, I. (2012). Does foreign direct investment reduce poverty in Africa and are there regional differences? World Development, 40(1), 75-95. doi:10.1016/j.worlddev.2011.05.014

[23] Green, WH (2008). Econometric analysis - Upper Saddle River 6th ed. pg 183.

[24] Gui-Diby, S. (2014). *Impact of foreign direct investments on economic growth in Africa*: Evidence from three decades of panel data analyses. Research In Economics, 68(3), 248-256. doi:10.1016/j.rie.2014.04.003

[25] Obwona, Marios B. (2001), "*Determinants of FDI and their Impact on Economic Growth in Uganda*". African Development Review. Blackwell Publishers Oxford. UK. Pp. 46-80

[26] Okon J. U, Augustine O. J and Chuku A. C (2012), "*Foreign Direct Investment and Economic Growth in Nigeria*: An Analysis of the Endogenous Effects". Current Research Journal of Economic Theory 4(3): 53-66.

[27] Osinubi, T. S. and Amaghionyeodiwe, L. A. (2010), "*Foreign Private Investment and Economic Growth in Nigeria*." REBS Review of Economic and Business Studies, Vol 3 Issue 1, pp. 105 – 127, June.

[28] Oyejide T. A. (2005), Capital Flows and Economic Transformation: *A Conceptual Framework" on Proceedings of Central Bank of Nigeria 5th Annual Monetary Policy Conference with the theme "Capital Flows and Economic Transformation in Nigeria*." Held at the CBN Conference Hall, Abuja. November 10th to 11th.

[29] Richard G. Lipsey, (2001), "*Understanding Technological Change*," Economics Study Area Working Papers 13, East-West Center, Economics Study Area.

[30] Ruxanda, G. and A. Muraru (2010), "*Foreign direct investment and economic growth: Evidence from simultaneous equation models*". Romanian J. Econ. Forecasting, 1: 45-57.

[31] Sala-i-Martin (1997*), I just Ran Four Regression", NBER Working Paper Series*. Working paper 6252. Link; http://www.nber.org/paper/w6252

[32] Uwhejevwe, T. S. (2005), "Corruption and National Responsibility" http://www.nigeriavillagesquare.com/articles/samuel-uwhejevwe-togbolo/corruption-and-national-responsibility.html

[33] Vernon R. (1966), *International investment and international trade in the product cycl*e. Quarterly Journal of Economics 80, pp. 190-207.

[34] Vu, T.B. and I. Noy (2009), *Sectoral analysis of foreign direct investment and growth in the developed countries*. J. Inter. Financial Markets Institutions Money, 19: 402-413.

[35] Vu, T.B. and I. Noy, (2009), *Sectoral Analysis of Foreign Direct Investment and Growth in Developed Countries,* International Financial Markets, Institutions & Money, Vol. 19, Issue, 402-413

[36] Zhang, K.H. (2001), *Does foreign direct investment promote economic growth*? Evidence from East Asia and Latin America". Contemporary Economic Policy, 19(2, April): 175–85.

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| *Appenixn1: Research Data* | | | | | | |
|---|---|---|---|---|---|---|
| Years | Real Gross domestic product | Total FDI inflow | Mining and quarrying | Construction | Agric, forestry & fishing | Manufacturing |
| 1980 | 3829500000 | 61700000 | 1383.183855 | 96.10270499 | 535500000 | 649000000 |
| 1981 | 3872666667 | -38400000 | 1224.48874 | 101.3910877 | 605111111.1 | 687000000 |
| 1982 | 3994777778 | 39000000 | 1434.939435 | 84.93889637 | 537777777.8 | 743000000 |
| 1983 | 3216307692 | 25700000 | 1439.19301 | 73.10166799 | 456692307.7 | 638307692.3 |
| 1984 | 2739444444 | 17200000 | 1086.091811 | 63.76833444 | 398444444.4 | 561444444.4 |
| 1985 | 2281258065 | 51500000 | 1177.832821 | 46.55722389 | 298451612.9 | 521451612.9 |
| 1986 | 1661948718 | 28300000 | 878.2795976 | 30.336463 | 202282051.3 | 376448717.9 |
| 1987 | 2269894737 | 74500000 | 853.0424209 | 35.82865652 | 247052631.6 | 583894736.8 |
| 1988 | 3713614458 | 93300000 | 1515.943274 | 62.59429411 | 609096385.5 | 1144048193 |
| 1989 | 3998637681 | 163700000 | 1599.212062 | 84.51395007 | 765369565.2 | 1238384058 |
| 1990 | 3285217391 | 202700000 | 1544.808335 | 80.43208051 | 597994202.9 | 1046568116 |
| 1991 | 3378882353 | 34300000 | 1497.752937 | 65.27402596 | 534337461.3 | 1126718266 |
| 1992 | 3181921788 | 45000000 | 1395.093925 | 51.47004397 | 676716759.8 | 1056131844 |
| 1993 | 3273237853 | 314400000 | 1166.624967 | 59.14815636 | 997641342.8 | 817526501.8 |
| 1994 | 3656647744 | 40000000 | 1204.116186 | 160.7480169 | 432453540.5 | 332342695 |
| 1995 | 3807067122 | 97000000 | 1170.20897 | 136.0923407 | 536391852.8 | 349397176.3 |
| 1996 | 3597220962 | 117100000 | 1084.609653 | 109.7772994 | 478367248.9 | 392658746.6 |
| 1997 | 4303281932 | 207400000 | 1230.356087 | 163.0280773 | 601708482.3 | 464536858.1 |
| 1998 | 3537683046 | 198000000 | 830.0443548 | 134.9573928 | 561374093.8 | 381139305.1 |
| 1999 | 3404311977 | 162000000 | 652.2560714 | 124.5802396 | 619243383.6 | 347628266.3 |
| 2000 | 3600683040 | 121700000 | 689.1698475 | 147.7733938 | 581502153.8 | 340383245.5 |
| 2001 | 4094480988 | 145000000 | 773.5946507 | 182.8889194 | 635769808.1 | 371855326.9 |
| 2002 | 4193845678 | 298390000 | 784.6369125 | 216.6600926 | 644234665.6 | 402016982.7 |
| 2003 | 4901839731 | 347000000 | 888.5999892 | 294.4649434 | 765525193.8 | 497445397.5 |
| 2004 | 6221077675 | 364040000 | 1181.677479 | 416.9066548 | 969302559.2 | 626166335.3 |
| 2005 | 8331870169 | 356940000 | 1633.84443 | 603.2297352 | 1215499160 | 819894432.6 |
| 2006 | 12756858899 | 615790000 | 2816.394408 | 1061.225464 | 1684705365 | 1200154950 |
| 2007 | 14056957976 | 1323900000 | 3172.740904 | 1312.764068 | 1701678576 | 1220116452 |
| 2008 | 17910858638 | 938620000 | 3779.044783 | 1771.698812 | 2051509704 | 1514178284 |
| 2009 | 15328342304 | 694800000 | 2954.813121 | 1678.088447 | 1770850221 | 1331255465 |
| 2010 | 20265556274 | 1729300000 | 4498.518773 | 2034.827447 | 1909215985 | 1535782035 |
| 2011 | 23460098340 | 1108500000 | 5939.330654 | 2141.188223 | 2263377703 | 1763264550 |
| 2012 | 25503370699 | 1731500000 | 6033.45078 | 2130.319805 | 2377304606 | 1804557729 |
| 2013 | 28045460442 | 2099800000 | 6996.385506 | 2147.593304 | 2307177672 | 1735132230 |
| 2014 | 27150630607 | 1507800000 | 6523.142961 | 2421.427749 | 1840706670 | 1851677285 |
| 2015 | 21154394546 | 1582666667 | 4990.097742 | 2126.117143 | 1053664333 | 1591299734 |
| 2016 | 20954754378 | 662813935 | 4898.840224 | 2283.523557 | 1305160677 | 1610612261 |

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| Appendix 2 : (Log of RGDP, MANU, MIN, CON, AGRI and FDI) | | | | | | |
|---|---|---|---|---|---|---|
| Years | ln_RGDP | ln_MANU | ln_MIN | ln_CON | ln_AGRIC | ln_FDI |
| 1980 | 22.066 | 20.29094 | 7.232143 | 4.565417 | 20.09871 | 18.42268 |
| 1981 | 22.07721 | 20.34785 | 7.110279 | 4.618985 | 20.22092 | 11.51293 |
| 1982 | 22.10825 | 20.42621 | 7.268878 | 4.441932 | 20.10296 | 18.16579 |
| 1983 | 21.8915 | 20.27433 | 7.271838 | 4.291851 | 19.93952 | 17.97751 |
| 1984 | 21.73102 | 20.14602 | 6.990341 | 4.155257 | 19.80308 | 17.83549 |
| 1985 | 21.54799 | 20.07213 | 7.071431 | 3.840682 | 19.51412 | 18.31532 |
| 1986 | 21.23126 | 19.74629 | 6.777965 | 3.41235 | 19.12517 | 18.01721 |
| 1987 | 21.543 | 20.18523 | 6.748809 | 3.578748 | 19.32511 | 18.5429 |
| 1988 | 22.03527 | 20.85784 | 7.323793 | 4.136674 | 20.22749 | 18.6968 |
| 1989 | 22.10922 | 20.93707 | 7.377266 | 4.436916 | 20.45587 | 19.12477 |
| 1990 | 21.9127 | 20.76878 | 7.342655 | 4.387413 | 20.20909 | 19.30114 |
| 1991 | 21.94081 | 20.84258 | 7.311721 | 4.178594 | 20.09654 | 18.10323 |
| 1992 | 21.88075 | 20.77788 | 7.240717 | 3.941 | 20.33276 | 18.24036 |
| 1993 | 21.90905 | 20.52179 | 7.06187 | 4.080045 | 20.72091 | 19.6817 |
| 1994 | 22.01981 | 19.62168 | 7.093501 | 5.079838 | 19.88498 | 18.17861 |
| 1995 | 22.06013 | 19.67172 | 7.064938 | 4.913334 | 20.10038 | 18.72448 |
| 1996 | 22.00343 | 19.78845 | 6.988976 | 4.698454 | 19.98589 | 18.8628 |
| 1997 | 22.18264 | 19.95655 | 7.115059 | 5.093923 | 20.21528 | 19.32043 |
| 1998 | 21.98674 | 19.75867 | 6.721479 | 4.904959 | 20.1459 | 19.28146 |
| 1999 | 21.94831 | 19.66665 | 6.480437 | 4.82495 | 20.24401 | 19.11633 |
| 2000 | 22.00439 | 19.64558 | 6.535488 | 4.99568 | 20.18113 | 18.89193 |
| 2001 | 22.13291 | 19.73401 | 6.651048 | 5.208879 | 20.27035 | 19.02773 |
| 2002 | 22.15688 | 19.812 | 6.665221 | 5.37833 | 20.28357 | 19.63527 |
| 2003 | 22.31288 | 20.025 | 6.789647 | 5.68516 | 20.45607 | 19.77005 |
| 2004 | 22.55121 | 20.25513 | 7.07469 | 6.032862 | 20.69209 | 19.8133 |
| 2005 | 22.84335 | 20.52469 | 7.398691 | 6.402298 | 20.91842 | 19.79551 |
| 2006 | 23.26933 | 20.90572 | 7.943213 | 6.96718 | 21.24486 | 20.29906 |
| 2007 | 23.36638 | 20.92221 | 8.062351 | 7.17989 | 21.25488 | 21.03251 |
| 2008 | 23.60867 | 21.13814 | 8.237226 | 7.479694 | 21.44184 | 20.70012 |
| 2009 | 23.45297 | 21.00939 | 7.991191 | 7.425411 | 21.29473 | 20.41306 |
| 2010 | 23.73219 | 21.15231 | 8.411504 | 7.618166 | 21.36996 | 21.293 |
| 2011 | 23.87857 | 21.29043 | 8.689352 | 7.669116 | 21.54012 | 20.86042 |
| 2012 | 23.96208 | 21.31358 | 8.705074 | 7.664027 | 21.58923 | 21.29424 |
| 2013 | 24.05709 | 21.27435 | 8.853149 | 7.672103 | 21.55929 | 21.48328 |
| 2014 | 24.02467 | 21.33936 | 8.783112 | 7.792113 | 21.33342 | 21.15913 |
| 2015 | 23.77511 | 21.18782 | 8.515211 | 7.662053 | 20.77554 | 21.20641 |
| 2016 | 23.76563 | 21.19988 | 8.496754 | 7.733475 | 20.98959 | 20.36847 |