



**IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC
GROWTH IN RWANDA**

**A Thesis Submitted to the to the School of Economics and Governance in Partial
Fulfillment for the Award of a Master Degree of Sciences in Economics
(Agricultural Economics Option) of University of Rwanda**

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I.DECLARATION

I undersigned **NKURUNZIZA Jean Marie Vianney**, a student at the University of Rwanda, School of Economics and Governance, Masters of Sciences in Economics, Option of Agricultural Economics, declare that this thesis entitled **“Impact of Foreign Direct Investment on Economic Growth in Rwanda”** is my own work and it is has not been submitted anywhere for the award any degree.

KigaliOctober 2018

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Signature.....

II.CERTIFICATION

It is certified that this Research Project was completed at University of Rwanda.

It is the work of **NKURUNZIZA Jean Marie Vianney**, a student in University of Rwanda, School of Economics and Governance under my supervision during this Research Project identified at University of Rwanda.

III.DEDICATION

I devote this Research Project to The LORD who always sustains me in my daily academic mission. Moreover, I dedicate to my darling wife **UWASE Francine and** my cherished daughter **NZIZA AMATA Glay**. I dedicate it again to my Supervisor **Dr. Charles RUHARA MURINDABIGWI**.

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ABSTRACT

The empirical study reveals controversies regarding the effect of foreign direct investment on the growth of the host economies .Some researchers found a positive effect while others found a negative effect.

The main objective of this study was to assess the impact of foreign direct investment on the economic growth in Rwanda over the period of 1970 to 2014. The study has examined time series data over a period of forty four years. Multiple regression technique and Eviews 10 econometric software were utilized to measure the relationship between independent (FDI) and dependent variable (GDP growth) .The result showed the positive but not statistical significant influence of the foreign direct investment on the economic growth in Rwanda.

The findings also reveal the complementarity between FDI and domestic investment toward the growth .Therefore the study concluded that foreign direct investment has a positive but it is insignificant effect on the economic growth in Rwanda and is opposed to some findings that foreign direct investment has a negative effect on the growth of economy. It was recommended that government should improve the state infrastructure to encourage the meaningful investment from abroad. It is also recommended that more attention should be paid to formulate policies that will maximize the benefits from FDI inflows. Otherwise multinationals will potentially get profit than the country since there is not profit repatriation low.

CHAPTER ONE: INTRODUCTION AND BACKRAOUND

1.1 Introduction

Foreign direct investment is the investment involving management control of resident entity in one country by an enterprise resident in foreign country or the foreign investor hold at least 10 per cent of the stake in the foreign enterprise. This means that the investor can exercise some considerable measures of influence over the enterprise or that the foreign investor invests directly (United Nation Conference on Trade and Development,2012).

During the four decades foreign direct investment (FDI) has become increasingly important in the developing world, with a growing numbers of developing countries succeeding in attracting substantial and rising amounts of inward FDI .economic theory has identified a number of channels through which FDI inflow may be beneficial to the host economy .yet the empirical literature has lagged behind and has had more trouble identifying these advantages in practice.

In 1970^s developing countries have undertaken different reforms such as the International Monetary Fund (IMF) assisted Structural Adjustment Programmes to attract more FDI.The objectives was to sustain political and economic stability along with improving their infrastructure in order to have a better investment climate.

The competition among Government of host countries results the removal of restrictions, and increases the amount of investment incentives, the number of Bilateral Investment Treaties (BITs) and regional agreements on investments. Therefore, in order to supplement national saving by capital inflows and promote their economic development, developing countries have been advised to rely primarily on FDI

Furthermore, liberalization of their economies and non restriction on foreign ownership initiative was been adopted toward the policy framework to facilitate and accelerated the process of attracting FDI was been implemented.

The regulations and financial reform that was been undertaken by The Government of Rwanda continues in the past decades aiming to foster both local and foreign investment makes the country a favorable place for investment. The country count 238 USD billion from the foreign

investment in the last decade. Rwanda Development Board (RDB) in 2017 registered foreign investments increase of \$USD 515 million to past year 2016.

The economic effects of FDI are hard to be measure with precision even though the Developing countries consider it as an important resource for their development. Thus, the assessment of development effect of FDI resorts to one of two general approaches. The first is econometric analysis of relationship between FDI and various measures of economic performance. The second is a qualitative analysis of particular aspects of transnational corporations' contribution, without any attempt at calculating a net rate of return.

The conclusion of the econometric analysis of FDI and economic growth remains unclear, especially as regards the causality within the relationship some analysis show a positive impact of FDI on growth to be a determinant of FDI while other shows insignificant relationship. Since growth depends on many factors whose effects are difficult to separate and since FDI itself affects several of these factors, an indeterminate conclusion is probably the most sensible, but there is a little doubt that fast growth and FDI inflows go hand in hand in many instances.

1.2. Problem Statement

The empirical studies shows differences on scale of profit to countries some positive other negative depending on the country features. Thus, there is need to take stock and examine whether the impact of FDI on economic growth in Rwanda is positive or negative. The motivation of this study is that, there are a limited number of researches on this subject which gives the news research opportunity to examine the incidence of result similarities and dissimilarities over time. Therefore far from reforms, and policy implemented recently, this study will critically contribute to the previous research and reveal the current aspect of FDI on Rwandan economy.

1.3. Objective of study

The overall objective of this study is to assess the impact of foreign direct investment on economic growth in Rwanda over the period of 1970-2014.

1.4. Research Question

Does FDI affect positively the economic growth in Rwanda?

1.5. Hypothesis of study

Based on the objective and research question listed above, two hypotheses tests are developed and tested.

H0: $\beta=0$, it means that Foreign direct investment has no effect on economic growth in Rwanda.

H1: $\beta\neq 0$, it Foreign direct investment has an effect on economic growth in Rwanda.

1.6. Significance of study

The different scholars in economics have identified controversial effects of FDI on economic growth developing countries either positive or negative. Thus, this study will identify the behavior of FDI on the economic growth in Rwanda. The study will be a source of information for police makers, the potential investors and future researcher as well.

CHAPTER TWO: LITERATURE REVIEW

Foreign direct investment is the investment involving management control of resident entity in one country by an enterprise resident in foreign country or the foreign investor hold at least 10 per cent of the stake in the foreign enterprise. This means that the investor can exercise some considerable measures of influence over the enterprise or that the foreign investor invests directly (United Nation Conference on Trade and Development ,2012).

2.1. Benefit from Foreign Direct Investment

According to World Investment Report (1999) FDI have offered a bundle of assets to the developing countries and they have been contributing significantly to the economic growth of the host developing countries. The assets that the FDI bundle comprises are:

- **Increases financial resources and investment:** FDI have brought the investible financial resources to host countries. The inflow are more stable and easier to service than commercial debt or portfolio investment in the distinction to other source of capital transnational corporations have invested in long term projects, taking risks and repatriating profits only when the projects yield returns.
- **Enhance technological capabilities:** Developing countries tend to lag in use of technology. TNCs have brought modern technologies, same note available without FDI and they have stimulated technical efficiency in local firms, suppliers, clients and competitors by providing assistance, acting as role models and intensify competition.
- **Boosting export competitiveness:** TNCs have provided access to export market, both for existing activities and new activities that exploit the host economy's comparative advantage. The growth of export itself offers benefits in terms of technological learning, realization of scale economies, competitive stimulus and market intelligence.
- **Generating Employment and Strengthening the Skills for Development:** TNCs employ and have world-wide access to individuals with advance skills and knowledge and can transfer such skills and knowledge to the foreign affiliates by bringing in experts and setting up state of the art training facilities.

- **Protection of Environment:** TNCs are in the lead in developing clean technologies and modern environment management system. They can use them in countries in which they operate. Spillovers of technologies and management method case potentially enhance environment management in local firms within the industries that host foreign affiliates.

2.2. The impact of the FDI on host countries

Apart from the impact on investment in host countries through their own investment activities, foreign affiliation may also affect investment by domestic firms. Two cases (crowding out or crowding in) can take place in either financial market or product market.

If transnational corporation (TNCs) finance their investment by borrowing in the host country under condition of scarcity of financial resource, and hence cause a rise in domestic interest rates, they may make borrowing unaffordable for some domestic firms. Crowding out can take place regardless of the industry.

Foreign affiliate can compete domestic firms in manufacturing in securing finance. It can take place at the stage of the investment decision, through the mechanism of financial market described above. It can also take place regardless on the, impact of FDI on condition in financial market or exchange rate, because domestic firm give up investment project to avoid the prospects of competing with more efficient foreign competitors.

The net effect of total host country investment depend on what happens to the release resources: if they go to the other activities in which local firm have a great comparative advantage, there were no crowding out of investment in the economy as whole.

However, it may be also that FDI forces local competitors to raise their efficiency and so lead to raising their investment and profitability. To make any generalization about crowding out, all these dynamic second-round effect need to be take into account. Crowding in take place when investment by foreign affiliate stimulates new investment in downstream or upstream production by other foreign or domestic producers or increases the efficiency of financial intermediation in the case of foreign firm, this represents associates FDI and reinforces the direct effect of FDI on total investment .in the case of domestic firm the effect of investment is indirect .Thus the existence of backward and forward linkages to local companies form the establishment of

foreign investors is the key consideration for determining the total impact of FDI on capital formation .World Investment Rapport (1999)

2.3. Cost of Foreign Direct Investment

Among the acknowledged costs are the possible negative effects of FDI on balance of payments due, for example, to an increase in the importation of input by subsidiaries and to the payments of dividends and royalties abroad. Moreover to the extent of multinational exercise consideration market power, not only do the direct cost of non comparative pricing have to be considered but also it necessary to take into account the overall inefficiency in the allocation of resources to which such pricing behavior lead.

In view of the above information FDI offer the potential for accessing the assets in package, this does not mean that simply opening up to FDI is the best way of obtaining or benefiting from them. As there noted above, there market failures in the investment process and divergences between TNCs and national interests .This mean government may have to intervene in FDI process to attract or promote FDI or to regulate and guide it.

2.4. Determinants of Foreign Direct Investment

According to World investment rapport (1998) there a number of factors that taken into accounts by investors while making foreign direct investment decision:

- **Macroeconomic and political stability:** This is invariably the essential precondition for foreign investment as it provides a stable environment for the promotion of risk capital investment in high-risk ventures. In particular stable exchange rates protect investors from exchange risk.
- **High growth potential:** Experience has shown that most equity investment fund concentrated in the market with growth potential.
- **Ease capital and income repatriation:** Investors should be assured that the income and capital gain of their investment could be easily repatriated .in this respect, foreign exchange control is major impediment to foreign investment.
- **Legal transparency, adequate investor's protection, adequate financial information and reporting disclosure.**

- **Exit mechanism:** Portfolio equity investors in the financial returns of their instruments. The usual exit mechanism for investment is the stock exchange. Hence the existence of liquid stock exchange is an advantage. However in case of venture capital investment, other exit mechanism can be used, secondary or “trade sale” of investor share to another company or repurchase of the investors shares by the entrepreneurs of invitee firm as allowed by contractual agreements.

2.5. Determinate of Economic Growth

Determinate of economic growth are interrelated factors that directly influence the rate of economic growth. There are six major determinants of growth. Four of these are typically grouped under supply factors which include natural resources, human resources, capital goods and technology. The others are demand and efficiency.

Supply factors.

- **Natural resources:** Natural resources include anything that exists in nature and which has exploitable economic value. The rate of growth increases on increase in quantity and quality of natural resources.
- **Human resource:** Human resource includes both skilled and unskilled workforce. Increase in quantity and quality of the workforce increases the economic growth. Here increase in quality refers to improvement of skill the workers possess. When more people work, more goods and services are produced and when more skilled workers have jobs they produce high value goods and services.
- **Capital goods:** Capital goods are tangible assets such as plant and machinery that can carry out processes which result in the production of other goods and services. Capital goods require big investment initially but they increase production and growth rate in future period.
- **Technology:** Technology includes methods and procedures used to produce various goods and services. New technology may be invented or current technology may be improved gradually by investing in research. Better techniques once devised allow faster production and increase rate of economic growth.

- **Demand factor:** the increased supply of goods and services caused by the supply factors must be sustained by increased demand for goods and services in economy.
- **Efficiency factor:** achieving the high output ration is a result of efficiency .efficiency includes both productive and allocative efficiency. High efficiency increases growth rate when it is coupled with full employment .to achieve maximum growth rate, an economy must uses its available resource in the least costly way to produce the optimum mix of goods and services and it must use its resources to the maximum extent possible.

2.6. Economic Growth Theories

According to Bano,Robert E. (1974,7) Economic growth is an increase (or decrease) in the value of goods and services that a geographic area produces and sells compared to an earlier time. If the value of an area's goods and services is higher in one year than the year before, it experiences positive growth, usually simply called "economic growth." In a year when less value than the year before is produced and sold, it experiences "negative economic growth," also called "recession" or "depression."

For more than half a century, there have been heated debates on the sources of economic growth of developing economies (Lewis, 1954; Solow, 1956; Harris-Todaro, 1970; Schultz, 1979; Romer,and Easterly, 2001). The perceived sources of economic growth have ranged from surplus labor to physical capital investment and technological change, foreign aid, foreign direct investment (FDI), investment in human capital, increasing returns from investment in new ideas and research and development. Other researchers such as Owens (1987),Sen (1990), and Kaufmann, Kray, and Mastruzzi (2006) have also focused on the impact of institutional factors such as the role of political freedom, political instability, voice and accountability on economic growth and development.

2.6.1. Economic Growth Models

2.6.1.1. Classical Model of Economic Growth

The interest of classical economist in economic growth derived from philosophical concern with the possibilities of progress an essential condition of which was seen to be the development of material basic of society. Accordingly, it was felt that the purpose of analysis was to identify the

forces in society that promoted or hindered this development, and hence progress, and consequently to provide a basis for policy and action to influence those forces

As a result of their work on economic analysis, the classical economists were able to provide an account of the broad forces that influence economic growth and of the mechanism underlying the growth process. An important achievement was their recognition that the capital accumulation and productive investment of a part of the social product is the main driving force behind economic growth and that under capitalism, this takes the form mainly of the reinvestment of profit.

The explanation of the forces underlying the accumulation process was seen as the heart of the problem of economic growth. Associated with accumulation is technical change as expressed in division of labor and change in methods of production. Smith, in particular, placed heavy emphasis on the process of extension of division of labor, but there is in general, no systematic treatment of the relation between capital accumulation and technical change in the work of the classical economists.

To these basic forces in economic growth they added the increase in the supply of labor available for production through growth of population according to TODARO. Thus, the classical economist analysis has later become a pivotal theme in the work of Marx and subjected to a detailed analysis (Donald J. Harris, 1958)

2.6.1.2. Adam Smith's Model of Economic Growth

This model primarily deals with capitalistic economies and their process of economic growth. In other words, this theory of economic growth portrays that process which enabled the developed and the rich nations of the world to attain economic growth.

In this model of economic growth we shall discuss the followings:

Production Function, Natural Resources, Labor Force, Capital Accumulation.

Production Function: The classical economics is based upon Labor Theory of Value which states that labor is the only factor of production and the costs of production entirely depend upon labor costs.

But Adam Smith includes land and capital, in addition to labor (because growth is a long run phenomenon) in the production function.

Thus Smith's production function shows that the production of the economy depends upon labor, land and capital. It is as:

$$Y = f(L, K, N)$$

Where Y_t = national product, K = capital, L = labor and N = natural resources.

- **Natural Resources:** According to Smith land is exogenously determined. Therefore, he considers such factor of production as given or fixed. In other words, there occurs no change in the supply of land with the passage of time.
- **Labor Force:** Considering the demand for labor as well as supply of labor, Smith says supply of labor is related to the population. While in long run the population is affected by the wages given over to the labor. If the labor is given more actual wages than the subsistence wages, then the marriages will take place leading to increase the population. On the other hand, if the actual wages are less than the subsistence wages the marriages will be postponed leading to decrease the population. If both the actual wages and subsistence wages are equal the population will remain constant. Whereas the demand for labor is determined by wage fund. In other words, according to Smith there is a specific amount of Wage fund in the economy such wage fund determines the demand for labor. Indeed the demand for labor depends upon changes in capital and changes in income. Thus, in long run because of perfect competition in the labor market demand for labor will be equal to supply of labor.
- **Capital Accumulation:** According to Smith the capital accumulation depends upon investment whereas the investment is determined by savings. Therefore it is the consideration of private profit which determines the saving. In other words, the desire to save and invest is determined by profit. He further says that as long as the rate of profit is more than the amount of compensation for the risk from the investment capital accumulation will continue taking place.

2.6.1.3. The Neoclassical Growth Theory

The neoclassical growth theory was developed in the late 1950s and 1960s of the twentieth century as a result of intensive research in the field of growth economics. This neoclassical growth theory lays stress on capital accumulation and its related decision of saving as an important determinant of economic growth. Neoclassical growth model considered two factor production functions with capital and labor as determinants of output. Besides, it added exogenously determined factor, technology, to the production function.

Thus neoclassical growth model uses the following production function:

$$Y_t = Af(K, L)$$

Where Y_t is Gross Domestic Product (GDP), K is the stock of capital, L is the amount of unskilled labor and A is exogenously determined level of technology. Note that change in this exogenous variable, technology, will cause a shift in the production function.

There are two ways in which technology parameter A is incorporated in the production function. One popular way of incorporating the technology parameter in the production function is to assume that technology is labor augmenting and accordingly the production function is written as

$$Y = F(K, AL)$$

Note that labor-augmenting technological change implies that it increases productivity of labor. The second important way of incorporating the technology factor in the production function is to assume that technological progress augments all factors (both capital and labor in our production function) and not just augmenting labor. It is in this way that we have written the production function equation above. To repeat, in this approach production function is written as:

$$Y = AF(K, L)$$

Considering in this way A represents total factor productivity (that is, productivity of both factor inputs).

When we empirically estimate production function specified in this way, then contribution of A to the growth in total output is called Solow residual which means that total factor productivity

really measures the increase in output which is not accounted for by changes in factors, capital and labor.

2.6.1.4. The Harrod-Domar Growth Model

The Harrod-Domar growth model stresses the importance of **savings and investment** as key determinants of growth. Basically, the model suggests that the economy's rate of growth depends on:

The level of national saving

The productivity of capital investment (this is known as the capital-output ratio)

If the capital-output ratio is low, an economy can produce a lot of output from a little capital. If the capital-output ratio is high then it needs a lot of capital for production, and it will not get as much value of output for the same amount of capital.

Basic Harrod-Domar model says:

Rate of growth of GDP = Savings ratio / capital output ratio

Based on the model therefore the rate of growth in an economy can be increased in one of two ways:

Increased level of savings in the economy (i.e. gross national savings as a % of GDP)

Reducing the capital output ratio (i.e. increasing the quality / productivity of capital inputs)

Low Developed Countries often have an abundant supply of labor it is a lack of physical capital that holds back economic growth and development. Boosting investment generates economic growth which leads to a higher level of national income. Higher incomes allow more people to save.

2.7. Empirical studies impacts of FDI on Growth

There are largest studies which has examined the effect of FDI on the economic growth of the host countries. The foundation of the theories for the empirical studies on FDI and growth derives from the either in classical or neoclassical models of growth .The neoclassical growth

models consider FDI as an addition to capital stock of the host country. FDI has no permanent impact on the growth rate within the assumption of diminishing returns to physical and technological change being exogenous.

Empirically, the effects of FDI on economic growth remain ambiguous. Despite the fact that some studies observe a positive impact of FDI on economic growth, others detect a negative relationship between the two variables.

The level of income can only be affected by FDI under its contribution to capital accumulation in the host countries by influencing the long term growth rate. Indeed there are a number of channels through which FDI affect the growth rate permanently in the long run. Thus, the output can be affected by FDI directly by increasing the stock of capital. However, under the assumption of perfect substitubility, the impact of FDI is likely to be small. As the long run growth is function of technological progress and human capital augmentation in new endogenous growth model, the main channel that FDI can increase the growth rate is by increasing production through technology transfer, productivity spillovers and externalities (De Mello 1997).

FDI is a composite bundle of capital stock, technology and can increase the existing stock of knowledge in the recipient economy through labor training, skill acquisition and diffusion and through the introduction of alternative management practices and organizational arrangements. Lee (1998)

(Borensztein and Gregorio, 2000) run regressions using a cross-sectional data on FDI flows from industrial countries and concluded that whether FDI increases the economic growth through the magnitude of its effects depends positively on the level of human capital available in the host country. This level of human capital is reflective of the absorptive capacity of the host country to new technology.

Sapsford (1996) FDI enhance growth in the host country whether the trade liberalization has been adopted. He shows that FDI is more important for economic growth and boost export promotion in import substituting countries.

FDI has the direct effects and has contributed to China's economic growth through increasing productivity, promoting exports, facilitating transition and technology diffusion as positive externality effect as well. Zonghou (2001)

Lopez and Rodriguez (2000) FDI has the positive influence on the economic growth of Costa Rica by generating the substantial spillover benefits to the local economy such as creating new training programmes in higher education institutions and attracting new supplies to Costa Rica.

There is a positive correlation between FDI and economic growth but host countries are required to have human capital, economic stability and liberalized market in order to benefit from long term FDI. Bengoa and Sanchez Robles (2003)

Baharumshah and Thanoon(2005) using the panel approach ,they confirmed EAST Asian countries economic growth is positively affect by FDI in the short run and in long run. They revealed that the FDI inflows are more productive than domestic investment as the spillover effect of knowledge embodied in FDI might increase domestic productivity and hence promote growth.

Li and Liu (2005) have investigated whether FDI affects economic growth based on panel data for eighty four countries over the period of 1970 -1999. They found significant relationship between FDI and economic growth. Indeed the FDI did not only directly promote economic growth by itself but also indirectly did so via their interaction with human capital.

Thomas KIGABO and Joseph BARICAKO(2009) have investigated the impact of FDI on economic growth of Rwanda and Burundi, they found a positive but not significant impact between FDI and real GDP growth in both countries.

According to pulatova (2016) foreign direct investment inflow in en economy increases the volume of export.

Pysarenko (2014) believe that when foreign direct investment comes to a domestic country (in specific business), that firm receives a competitive advantage due to the usage of new knowledge, experience, ways of production and management. Adding that current successful economic growth of developing countries is explained by "catch up effect" in technological development with developed countries.

Foreign Direct Investment contributes significantly in the human resource development, capital formation and organization and managerial skills of the people in an economy. ahmad(2015)

However many empirical research found that FDI is positively correlated to the economic growth, others have found the opposite.

Roen and Bartoldus (2002) suggest through repatriation of profit and transfer pricing effect, Foreign Direct Investment can have a negative impact on domestic economies.

According to Greenwood (2002) the spillovers effect from the foreign owned to domestically owned firms are mostly negative.

Levine(2002) using the data from World Bank and IMF nationals account of seventy two countries over the period of 1960-1995 had analyzed the relationship between FDI and economic growth and he concluded that FDI does not exert a robust influence on economic growth. Moreover, he showed that the impact of FDI on the economic growth does not depend on the stock of human capital.

Firebaugh (1992) lists several additional reasons why FDI inflows may be less profitable than domestic investment and may even be detrimental. The country may gain less from FDI inflows than domestic investment, because of multinationals are less likely to contribute to government revenue; FDI is less likely to encourage local entrepreneurship; multinationals are less likely to reinvest profits; are less likely to develop linkages with domestic firms; and are more likely to use inappropriately capital-intensive techniques. FDI may be detrimental if it “crowds out” domestic businesses and stimulates inappropriate consumption pattern.

On Sri Lanka case study Athukorala (2003) have analyzed the correlation between FDI and economic growth and he found that there is no robust link between FDI and growth. This paper showed that the causality direction was not FDI to GDP growth but GDP growth to FDI.

Durham (2004) He used the eighty countries data for the period 1979-1998 to assess the relationship between FDI with GDP growth and he failed to identify a positive relationship between the variables.

CHAPTER THREE: METHODOLOGY

3.1 Overview of process on different tests of the research

This research will assess the impact of foreign direct investment on the economic growth of Rwanda. The researcher will need to illustrate **graphically** all variables in order to verify if the following step of Stationarity test will use either intercept or intercept and trend.

Moreover, the test of **Stationarity** on all variables (dependent and independents) will be applied. A type of stochastic process that has received a great deal of attention and scrutiny by time series analysts is the so-called stationary stochastic process. Broadly speaking, a stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed.

Once, the variables are not stationary at their levels; it means that the calculated results are less than the critical results or their probabilities are greater than 5% at 95% of confidence interval and 10% at 90%, those cases will push the researcher to integrate at first difference or second one.

After testing the stationarity, the next step will be **cointegration** testing: we say that the two variables are cointegrated. Economically speaking, two variables will be cointegrated if they have a long-term, or equilibrium, relationship between them. Engle–Granger (EG) will be useful in the test. Here, once the variables are cointegrated, it implies that the model will statistically significant and it can be used to formulate a policy.

Otherwise, the researcher should find other alternatives. The **long-run model** will be regressed once cointegration is successfully computed. Of course, in the short run there may be disequilibrium. This situation, the researcher will be obliged to find a mechanism whereby, it will be solved. This is what we call **Error Correction Mechanism (ECM)** and it has to possess a negative Sign in order to adjust rather than increase the errors. By then, we have to generate residuals because the will be used in regression model.

Impulse responses trace out the responsiveness of the dependent variables in the VAR to shocks to each of the variables. So, for each variable from each equation separately, a unit shock is applied to the error, and the effects upon the VAR system over time are noted. ¹³ Monte Carlo analysis will be used.

The study has examined time series data of Rwanda from World Bank nationals' account for a period of forty years, Since 1970 to 2014. The multiple regression was been performed using statistical Software package. The E-views 10 was been used to facilitate the econometric analysis of the behavior of the foreign direct investment on economic growth of Rwanda. Finally conclusion and recommendation based on the finding was been released.

3.2. The Model specification

The purpose of this study is to assess the effect of FDI on economic growth of Rwanda over the period of 1970-2014 using the data from World Bank nationals' account. The study has examined time series data over a period of forty four years .Multiple regression analyses were utilized to measure the relationship between independent (FDI) and dependent variable (GDP growth). Based on the neoclassical growth model theories, we developed the model to examine the effect of FDI on the economic growth Rwanda. The econometric model derived from neoclassical production function.

Trade, Official Development Aid and FDI are introduced as the additional inputs, beside labor and domestic capital based on the neoclassical growth model theories. The inflation variable was been introduced too as proxy of the country macroeconomic stability. As stated in previews chapter, FDI is the prime source of human capital capacity building and new technology to developing countries and this variable is included in the production function in order to capture the externalities, learning by watching and spillover effects associated with FDI. Therefore in our model, FDI could contribute to economic growth directly through additional capital input and labor as well as indirectly through improving human capital and trade.

We introduce trade as an additional factor input into the production function, following the large number of empirical studies which examined the export-led growth hypothesis .There are two reasons that we can include trade into the production function. Firstly, exports (imports) are likely to alleviate serious foreign exchange constrains and can provide greater access to

international markets. Secondly, exports (imports) like FDI are likely to result in a higher rate of technological innovation and dynamic learning from abroad Hatcher (1991).

Thus, the model specification derived from the augmented production function will have the following form:

$$\text{Equation 1: } Y_{it} = \beta_0 + \beta_1 L_{it} + \beta_2 DK_{it} + \beta_3 FDI_{it} + \beta_4 TRADE_{it} + \beta_5 ODA_{it} + \beta_6 INFL_{it} + \varepsilon_{it}$$

Where Y_{it} Refer to annual real GDP growth, L_{it} denotes stock Labor force, DK_{it} is domestic capital investment, FDI_{it} is Foreign Direct Investment inflow, $TRADE_{it}$ is the aggregate value of of imports and export over the GDP for the same period .is the relative importance of international trade in economy of country . , ODA_{it} official Development Aid, $INFL_{it}$ and ε_{it} stochastic disturbance. Thus $\beta_0, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficients of respective variables.

Table 1: Definition and Expected Signs of Variables

Variables	Definition and description	Expected Sign
Y :	Annual percentage growth of real gross domestic product.	+/-
ODA:	Annual percentage growth Official Development Assistance	+/-
DK	Domestic Capital Or capital formation as percentage of annual GDP	+
FDI	foreign direct investment inflow as percentage of Annual real GDP growth of	+/-
Labor	the number of people aged between 18-64 as percentage of total population which the country Labor force	+/-
Trade	Trade to GDP ration : is the aggregate value of of imports and export over the gdp for the same period .is the relative importance of international trade in economy of country .	+
Inflation	Annual inflation rate was used as proxy of the country macroeconomic stability	+/-

Source: World Bank national accounts data, and OECD National Accounts data files.

3 .3. Data for modeling.

3.3.1. Time series data from World Bank nationals' account

YEAR	REALGDP	FDI	DK	TRADE	LABOR	ODA	INFLATION
1970	840563473.4	60000	15500000.02	25299999.03	49.43162236	9.881817723	0.514885808
1971	850706054.5	1700000	20359585.74	22766631.36	49.55230208	11.27147454	0.488580074
1972	852943992.2	500000	23560066.25	20411486.91	49.7292346	12.20403225	3.092193809
1973	882268958.3	2000000	27406401.21	33721790.51	49.92862603	13.47344604	9.373674076
1974	894707394.1	2200000	32265521.7	37535555.84	50.10703041	15.21533956	31.08829937
1975	875794841.8	3000000	78567573.26	52450643.38	50.24192701	15.89444331	30.22604657
1976	1046614923	5607533.673	88133134.63	92977837.57	50.1126959	12.41928988	7.165861514
1977	1067485570	4794908.563	112471862.4	106530362.9	49.99087793	12.78257785	13.65514651
1978	1165169475	4860992.024	150411382	133872841.2	49.87073241	13.78786782	13.2705338
1979	1303474020	13461650.58	133462978.4	233473688.3	49.75329206	13.30246837	15.67332944
1980	1420155962	17707777.08	202523981.3	181144512.9	49.63781803	12.26436678	7.249392993
1981	1497358473	19205990.61	187126463	138251006.5	49.26888083	10.82521848	6.450664472
1982	1524473335	20653349.16	250182785.8	162572589.7	48.97526279	10.59428753	12.56513653
1983	1615642175	10916401.72	200210346.8	171373975.5	48.73252216	10.02350359	6.593002143
1984	1547126454	15064915.09	250915629.8	200513031.1	48.49627975	10.24732351	5.369570388
1985	1615242538	14618053.38	296963778	184987524.6	48.23970908	10.3472427	1.759330057
1986	1703630830	17593148.42	308719218.6	244728575.5	47.94955038	10.60131803	1.117066573
1987	1703221344	17593613.95	337953447.4	160729866.9	47.64614625	11.15069866	4.133014908
1988	1779846291	21047058.39	347165265.9	158571071.7	47.41088879	10.28302009	2.978643557
1989	1779196037	15508619.43	322898695.5	147651286	47.46266005	9.420311139	1.010278248
1990	1736507945	7562353.797	373601775.9	143182959.4	48.01739456	11.34326652	4.185763726
1991	1692845543	4577984.591	268039804.9	139864227.5	48.36462915	18.89716773	19.63716581
1992	1792261710	2187569.8	317220023.1	112984503.2	49.3140694	17.28426787	9.560411876
1993	1646932730	5851479.716	330171823.6	102031305.5	50.85371339	18.09055878	12.35438876
1994	819380866.9	1000	75231818.64	47498580	52.6118052	94.94603358	12.43591216
1995	1108000225	2212201.515	173451854.2	66627306.07	54.01752652	53.48062105	12.34784437
1996	1249222563	2218241.13	198647416.1	83373731.5	54.16436525	34.00427602	7.411371735
1997	1422236796	2598560.174	255696103.5	144372276.3	53.74516724	12.51567934	12.01542252
1998	1548228053	7089193.681	294575251.2	111106101.9	52.89516568	17.76929716	6.210067095
1999	1665600715	1725716.61	238998980.4	113095435.1	52.10688843	20.65456877	-2.405932097
2000	1804157124	8319040.466	232064995.3	109644891.8	51.75561823	18.69764238	3.899529803
2001	1960558679	4634137.685	230026783.6	141989054.8	52.11859894	18.46045647	3.342855067
2002	2225440545	2610000	226141902.2	118014518.3	52.82750533	21.88378292	1.992585425
2003	2257739151	4655622.785	255740212.4	156048027.8	53.747639	18.46597805	7.44970014
2004	2414570526	7660000	313967134.7	232401486.4	54.55252014	23.8434375	12.25071029
2005	2581465675	10500000	406939380.7	295792942	55.03284219	22.60543952	9.014089181
2006	2819870988	30643966.47	518388001.8	382447092.3	55.26910779	19.56958128	8.882826548
2007	3034543646	82283165.86	714866853.8	599683703.4	55.22187708	19.22634832	9.080722059
2008	3373273367	103346051.9	1159370041	610772230.1	55.00918227	19.6053819	15.44493118

2009	3584709753	118670000	1254660324	631729391.8	54.85515922	17.7035218	10.3941857
2010	3846847722	42332000	1322173118	689382092.4	54.88152961	18.23525625	2.309146191
2011	4148899702	106210000	1507563220	924527720.4	54.90548935	19.88729901	5.670682731
2012	4513519593	159814904.8	1868808656	1020682079	55.12587649	12.33390038	6.27090301
2013	4724955979	257642420.2	1994939966	1175313468	55.47430312	14.70247488	4.234780151
2014	5053976886	291726096.5	2074670571	1178623719	55.8362424	13.33952928	1.784100412

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION OF RESULTS

In this chapter we empirically explore different findings and results drawn from different test and analyses made on our data set to answer our research questions. we shall start testing data graphically to check if variables have intercept or trend and intercept. The following test will stationarity in order to understand if there is a consistence of the mean, variance and covariance.

The next will be cointegration test in order to check the variables have the long term relationship. We shift to the **Error Correction Model** or Equilibrium Correction Mechanism; this last will assist in discovering the time which can be taken to adjust short run shocks which may occur. Finally, we will check on Vector Autoregressive Models (VAR) whereby, we check lag selection to be used while estimating; it will lead us test if our data are **normally distributed**, test of **autocorrelation** and test of **Homoskedasticity**. This chapter analyses Impact of Foreign Direct Investment on Economic Growth in Rwanda.

4. 1. Graphical illustration of variables at the market.

Figure 1: Graphical illustration of REAL GDP

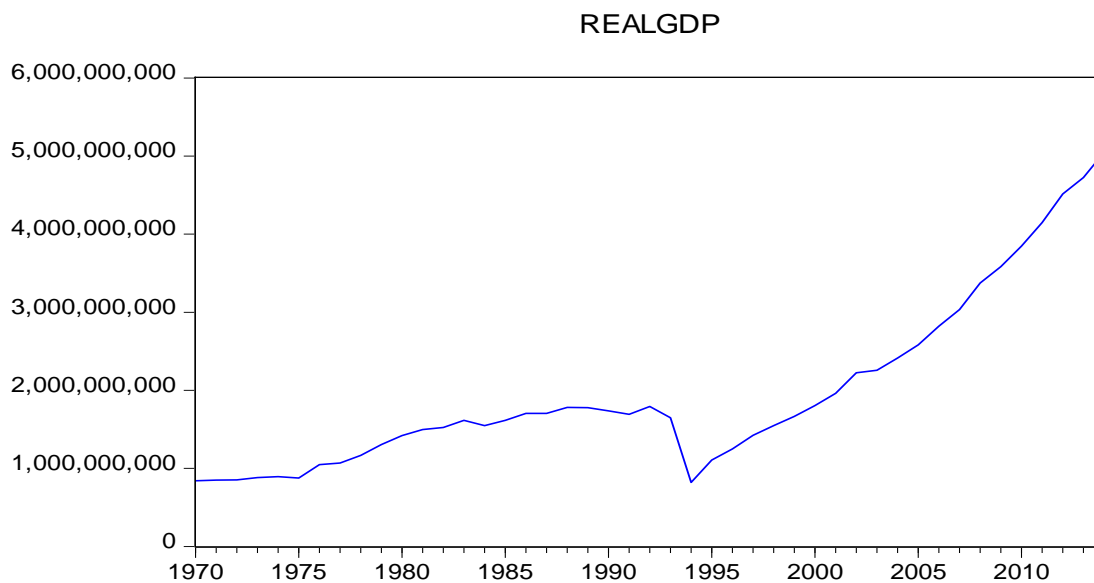


Figure 2: Graphical illustration of Domestic capital
DK

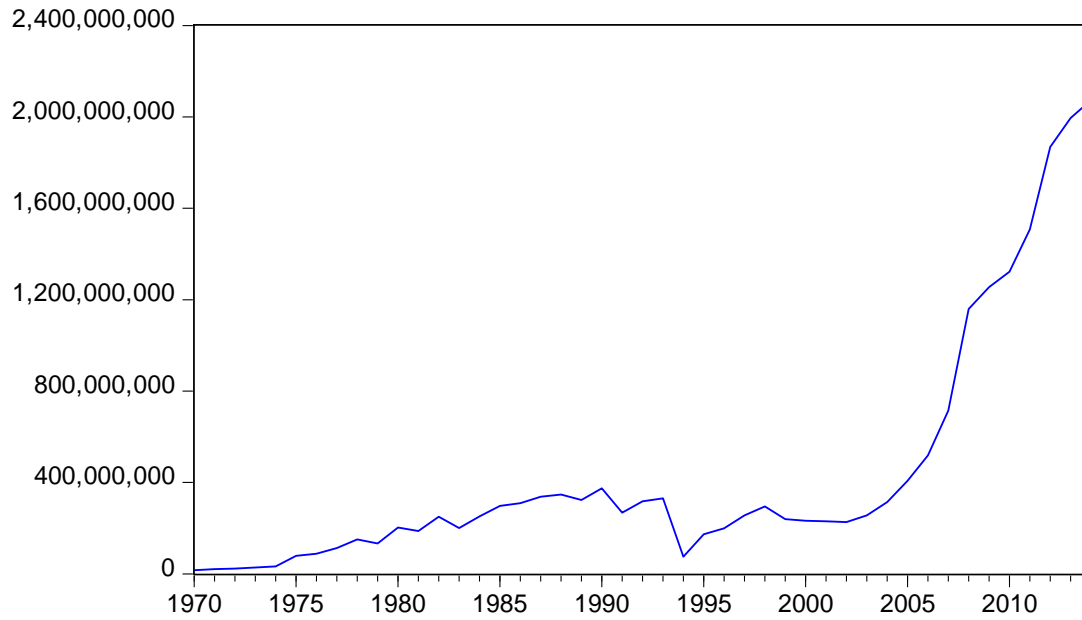


Figure 3: Graphical illustration of Foreign Direct Investment
FDI

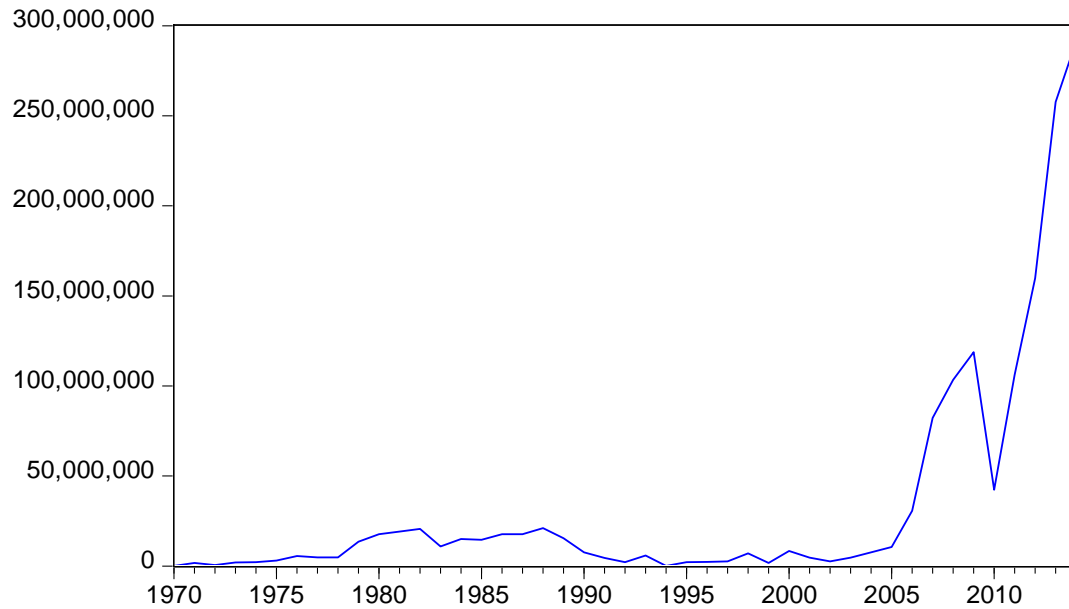


Figure 4: Graphical illustration of TRADE

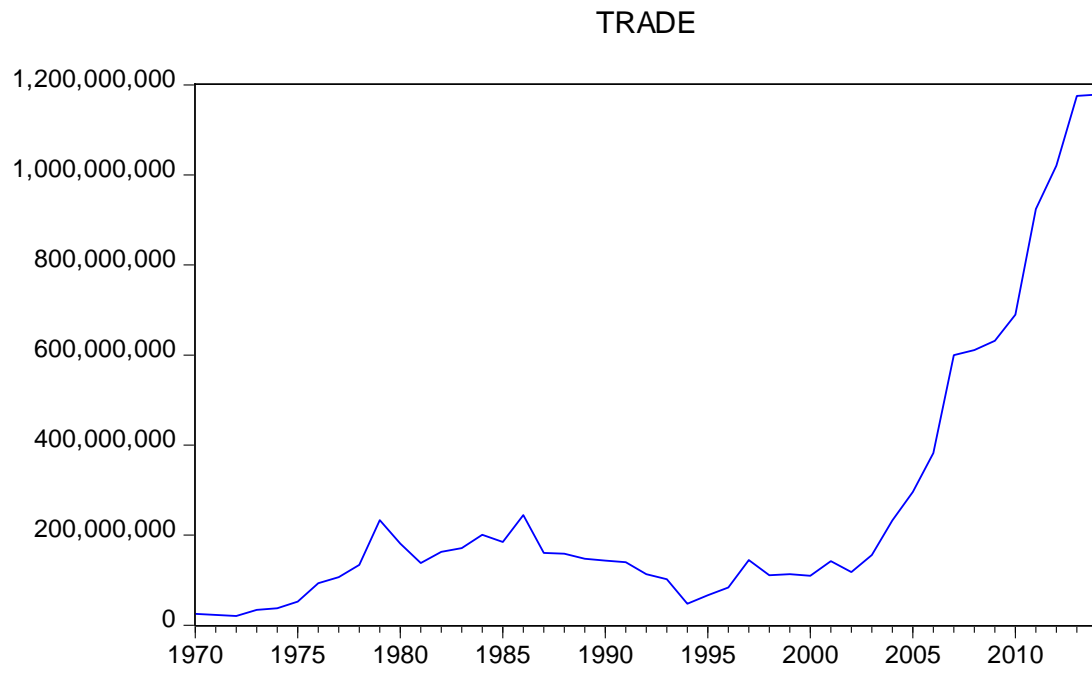


Figure 5: Graphical illustration of LABOR

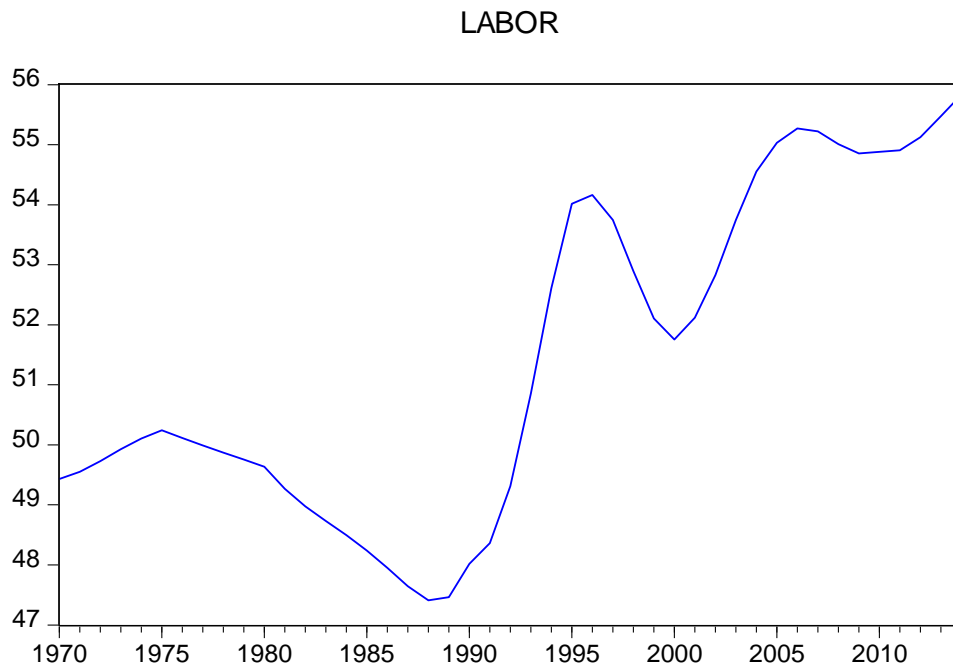


Figure 6: Graphical illustration of ODA

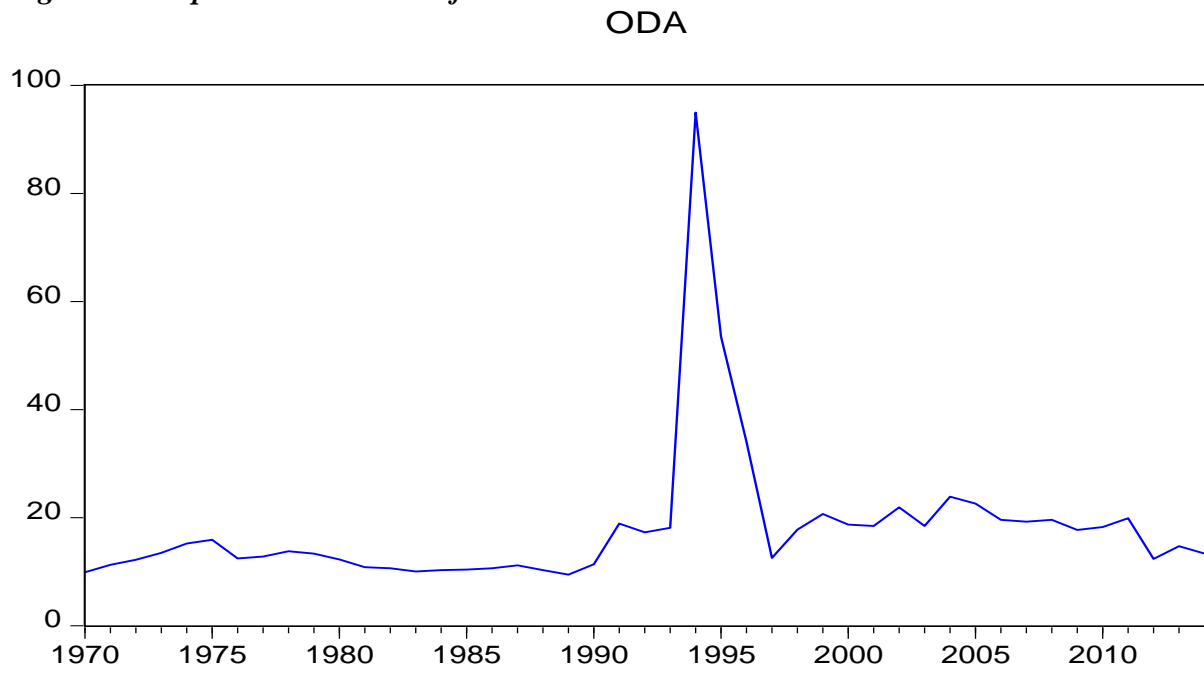
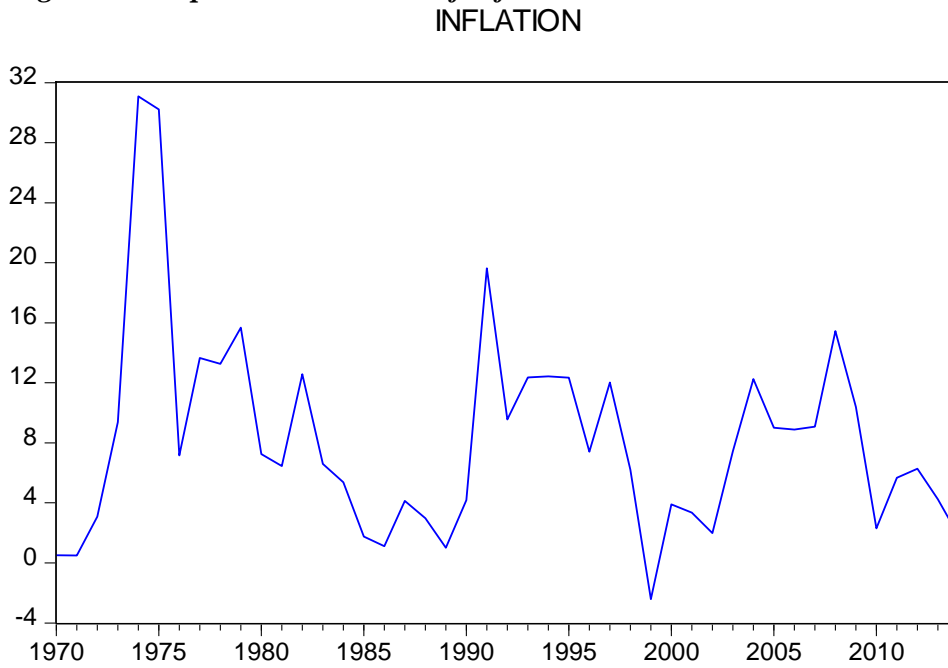


Figure 7: Graphical illustration of inflation



4.2. Tests and Analysis of the Data

In this research we used time series data for a period 1970 up to 2014 .Most of Macroeconomic time series data are not stationary .when the dependent and independent variables in time series data are not stationary, a no sense regression or spurious regression model is likely to occur. The R- square may be higher but the combined with low Durbin Watson statistic, and as a consequence the coefficient seems statistically significant while they are not. This case can mislead the economic interpretation. Though to avoid obtaining misleading statistical inferences we have performed the stationary test of all used variable in the model.

4.2.1. Stationarity Test

The Stationary test is the first to perform on time series data to see whether they are stationary or not. Most of the time series data are not stationary because they usually have the linear or exponential times trend. Ramathat (1985) .The stationarity test is crucial in modeling because since the macroeconomic data of different period cannot be included in the same model .in fact, a series being stationary or not, influences the choice of model to be adopted .when all series are not stationary, we have to transform them until they become stationary by differencing them before modeling and estimating parameters associated to the stationarity component.

The rationale behind stationarity lies much on the conventional asymptotic theory for least squares method used in regression .This test is used to know the methodology to be adopted When the series are stationary, we use the Ordinary least squares (OLS), but when the series are not stationary OLS cannot be used because there may be no sense regression or spurious regression.

Consider Y_t and Y_{t-1} , Y_t is stationary when $E(\varepsilon)$ variance and auto variance of Y_{t-1} remain Identical to those of Y_t . When a series is stationary, its mean, variance and auto covariance of various lags are constant for any point where they are measured, in other words they do not vary over time. Gujarati.D.N.(2004:789)

Augmented Dickey Fuller (ADF) test is to test the significance of the coefficient γ on y_{t-1} .if the variable is not statistically significant from zero, there is evidence of presence of unit root. The ADF test unit test is given as: the null hypothesis ($H_0 Y_t = 0$) which indicate a unit root or time

series is non – stationary versus the alternative hypothesis ($H_1 : Y \neq 0$) which indicates the times series is stationary. Rejecting null hypothesis would mean that y_t is stationary.

4.2.1. Test of Stationarity using Augmented Dickey-Fuller Test

4.2.1.1. Test of Stationarity using Augmented Dickey-Fuller Test on REALGDP

Null Hypothesis: D(REALGDP) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.642073	0.0002
Test critical values:		
1% level	-4.186481	
5% level	-3.518090	
10% level	-3.189732	

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

SOURCE: Estimated By Author Using E-Views 10

4.2.1.2. Test of Stationarity using Augmented Dickey-Fuller Test on Foreign Direct Investment

Null Hypothesis: D(FDI,2) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 3 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.947911	0.0000
Test critical values:		
1% level	-4.211868	
5% level	-3.529758	
10% level	-3.196411	

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

SOURCE: Estimated By Author Using E-Views 10

4.2.1.3. Test of Stationarity using Augmented Dickey-Fuller Test domestic capital (dk)

Null Hypothesis: D(DK) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.210782	0.0006
Test critical values:		
1% level	-4.186481	
5% level	-3.518090	
10% level	-3.189732	

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

SOURCE: Estimated By Author Using E-Views 10

4.2.1.4. Test of stationarity using augmented dickey-fuller test for Labor

Null Hypothesis: D(LABOR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.577468	0.0036
Test critical values:		
1% level	-4.192337	
5% level	-3.520787	
10% level	-3.191277	

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

SOURCE: Estimated By Author Using E-Views 10

4.2.1.5. Test of stationarity using augmented dickey-fuller inflation

Null Hypothesis: INFLATION has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.000860	0.0158
Test critical values:		
1% level	-4.180911	
5% level	-3.515523	
10% level	-3.188259	

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

SOURCE: Estimated By Author Using E-Views 10

4.2.1.6. Test of stationarity using augmented dickey-fuller official development aid (oda)

Null Hypothesis: ODA has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.866825	0.0220
Test critical values:		
1% level	-4.180911	
5% level	-3.515523	
10% level	-3.188259	

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

SOURCE: Estimated By Author Using E-Views 10

4.2.1.5. Test of stationarity using augmented dickey-fuller trade

Null Hypothesis: D(TRADE) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.584788	0.0002
Test critical values:		
1% level	-4.186481	
5% level	-3.518090	
10% level	-3.189732	

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

SOURCE: Estimated By Author Using E-Views 10

Table 2: Summary of Test of stationarity using augmented dickey-fuller

VARIABLES	A DF test statistic	ADF Calculated	Probability	Findings
REALGDP	-5.642073	-3.518090	0.0002	Stationary at 1 st difference
FDI	-7.947911	-3.529758	0.0000	Stationary at 2 ^{sd} difference
DK	-4.577468	-3.518090	0.0036	Stationary at 1 st difference
LABOR	-4.577468	-3.520787	0.0012	Stationary at 1 st difference
TRADE	5.584788	-3.518090	0.0002	Stationary at 1 st difference
ODA	-3.866825	-3.515523	0.0220	Stationary at level
INFLATION	4.000860	3.124528	0.0158	Stationary at level

SOURCE: Estimated By Author Using E-Views 10

The table above illustrates the result of ADF test for unit root. The probability values show that the variables are statistically significant for all lags. It indicates that the times series is stationary respectively to the result presented in table 2 and there is evidence for rejecting the null hypothesis.

4.2.2 CO INTEGRATION TEST

The test for co-integration indicates the existence of long run relationship between the variable under study presented in equation (1) above. The variables are tested using the critical value bounds for long run. Therefore the two hypothesis test was conducted for long run relationship .the null hypothesis ($H_0: Y_t$) indicate that there is no long run relationship ,while alternative $H_1: Y_t \neq 0$ there is a long run relationship between the variable. According to ENGEL-GRANGER, different variables in the model are co integrated if the residuals from the long run estimated model are stationary .Using ENGEL-GRANGER, co-integration test, the table below illustrates the summary of test statistics.

4.2.2.1. Co integration test REALGDP and FDI

Cointegration Test - Engle-Granger
Date: 10/14/18 Time: 08:18
Equation: UNTITLED
Specification: D(REALGDP) D(D(FDI)) C
Cointegrating equation deterministics: C
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=9)

	Value	Prob.*
Engle-Granger tau-statistic	-4.839177	0.0017
Engle-Granger z-statistic	-31.27695	0.0007

*MacKinnon (1996) p-values.

REALGDP and FDI are cointegrated, since the p- value of Engle-Granger tau-statistic and z-statistic are 0.0007.

4.2.2.2. Co integration test REALGDP and Domestic capital

Cointegration Test - Engle-Granger

Date: 10/14/18 Time: 08:22

Equation: UNTITLED

Specification: D(REALGDP) D(DK) C

Cointegrating equation deterministics: C

Null hypothesis: Series are not cointegrated

Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=9)

	Value	Prob.*
Engle-Granger tau-statistic	-5.800142	0.0001
Engle-Granger z-statistic	-39.30423	0.0000

*MacKinnon (1996) p-values.

REALGDP and DOMESTIC CAPITAL are cointegrated, since the p- value of Engle-Granger tau-statistic and z-statistic are 0.0000.

4.2.2.3. Co integration test REALGDP and TRADE

Cointegration Test - Engle-Granger

Date: 10/14/18 Time: 08:33

Equation: UNTITLED

Specification: D(REALGDP) D(TRADE) C

Cointegrating equation deterministics: C

Null hypothesis: Series are not cointegrated

Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=9)

	Value	Prob.*
Engle-Granger tau-statistic	-6.486397	0.0000
Engle-Granger z-statistic	-44.29028	0.0000

*MacKinnon (1996) p-values.

SOURCE: Estimated By Author Using E-

Views 10

REALGDP and TRADE are cointegrated, since the p- value of Engle-Granger tau-statistic and z-statistic are 0.0000.

4.2.2.4. Co integration test *REALGDP* and *OFFICIAL DEVELOPMENT AID*

Cointegration Test - Engle-Granger

Date: 10/14/18 Time: 08:36

Equation: UNTITLED

Specification: D(*REALGDP*) ODA C

Cointegrating equation deterministics: C

Null hypothesis: Series are not cointegrated

Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=9)

	Value	Prob.*
Engle-Granger tau-statistic	-4.065169	0.0128
Engle-Granger z-statistic	-24.73219	0.0071

*MacKinnon (1996) p-values.

SOURCE: Estimated By Author Using E-

Views 10

REALGDP and *ODA* are cointegrated, since the p- value of Engle-Granger tau-statistic and z-statistic are 0.0000.

4.2.2.4. Co integration test *REALGDP* and *LABOR*

Cointegration Test - Engle-Granger

Date: 10/14/18 Time: 09:11

Equation: UNTITLED

Specification: D(*REALGDP*) D(*LABOR*) C

Cointegrating equation deterministics: C

Null hypothesis: Series are not cointegrated

Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=9)

	Value	Prob.*
Engle-Granger tau-statistic	-5.325110	0.0004
Engle-Granger z-statistic	-35.68892	0.0001

*MacKinnon (1996) p-values.

SOURCE: Estimated By Author Using E-Views 10

REALGDP and *LABOR* are cointegrated, since the p- value of Engle-Granger tau-statistic and z-statistic are 0.0001.

4.2.2.3. Co integration test REALGDP and INFLATION

Cointegration Test - Engle-Granger

Date: 10/14/18 Time: 08:40

Equation: UNTITLED

Specification: D(REALGDP) INFLATION C

Cointegrating equation deterministics: C

Null hypothesis: Series are not cointegrated

Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=9)

	Value	Prob.*
Engle-Granger tau-statistic	-5.002387	0.0010
Engle-Granger z-statistic	-32.48813	0.0005

*MacKinnon (1996) p-values.

SOURCE: Estimated By Author Using E-Views 10

REALGDP and INFLATION are cointegrated, since the p- value of Engle-Granger tau-statistic and z-statistic are 0.0005.

Table 3: Co Integration Test REALGDP, FDI,DK, LABOR,TRADE,ODA and INFLATION

Cointegration Test - Engle-Granger		
Date: 09/17/18 Time: 02:04		
Equation: UNTITLED		
Specification: D(REALGDP) D(D(FDI)) D(DK) D(LABOR) D(TRADE) ODA INFLATION C		
Cointegrating equation deterministics: C		
Null hypothesis: Series are not cointegrated		
Automatic lag specification (lag=0 based on Schwarz Info Criterion, maxlag=9)		
Values	prob	
Engle-Granger tau-statistic	-6.143649	0.0127
Engle-Granger z-statistic	-40.58029	0.0100
*MacKinnon (1996) p-values.		

Source: Estimated By Author Using E-Views 10

The table 3 shows that there is a long run relationship among the variables in the equation (1) and statistical significant at 5%, with Probability of 0.0127, thus the null hypothesis of Series is rejected. This provides the strong evidence that a long run relationship exist among the variables in equation (1).

Table 4: Co Integration Equation

Dependent Variable: D(LOG(REALGDP))				
Method: Fully Modified Least Squares (FMOLS)				
Date: 09/13/18 Time: 01:31				
Sample (adjusted): 1973 2014				
Included observations: 42 after adjustments				
Cointegrating equation deterministics: C				
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth= 4.0000				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(D(LOG(FDI)))	0.009437	0.004146	2.136133	0.0291
D(LOG(K))	0.157858	0.047781	3.303813	0.0022
D(LABOR)	0.035750	0.023917	1.494713	0.1440
D(LOG(TRADE))	0.137078	0.044356	3.090426	0.0039
ODA	0.001181	0.001035	1.140871	0.2617
INFLATION	-0.004046	0.001661	-2.436081	0.0201
C	0.072413	0.025494	2.840351	0.0075
R-squared	0.753287			

Source: Estimated By Author Using E-Views 10

The table above reveals the results of cointegration test. The result reveals that there long run relationship among the variables and there is strong evidence of rejecting null hypothesis since the probability values for all variables are statistical significant at 5%.

4.3.3 ERROR CORRECTION MODEL (ECM)

The error correction model was been performed to test whether there is a short run relationship among variables in our model and it is done once we have the a long run relationship .This shows the correspondence between the co integration and the error correction mechanisms for each set of co integrated variables there exist a valid error correction presentation of data .This correspondence is expressed in the error correction term in the E-views 10 helped to run the following ECM MODEL.

Table 5:Error Correction Model (ECM)

Dependent Variable: D(LOG(REALGDP))				
Method: Least Squares				
Date: 09/13/18 Time: 01:50				
Sample (adjusted): 1974 2014				
Included observations: 41 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(D(LOG(FDI)))	0.008161	0.004598	1.775033	0.0851
D(LOG(DK))	0.156058	0.051521	3.029022	0.0047
D(LABOR)	0.030637	0.025787	-1.188074	0.2433
D(LOG(TRADE))	0.136032	0.048405	2.810263	0.0083
ODA	0.002461	0.001127	-2.184612	0.0361
INFLATION	-0.004325	0.001760	-2.456699	0.0195
E(-1)	-0.182023	0.175205	-1.038916	0.3064
C	0.099736	0.027349	3.646748	0.0009
D(D(LOG(FDI)))	0.008161	0.004598	1.775033	0.0851
R-squared	0.782879			

Source: Estimated By Author Using E-Views 10

$$\text{ECE: } 0.008161\text{FDI} + 0.156058 \text{ DK} + 0.030637 \text{ LABOR} + 0.002461\text{ODA} - 0.004325\text{INFL} - 0.182023 \text{ E}(-1) + \text{U}$$

The statistical significance of the EC term is that it measures the deviation of the dependent variable from the long run trend. the error correction term represents the mechanism of self correcting of the system for deviation from its long run trend.

Note from the above findings 18% of the error are being corrected each year. The errors will be corrected in 5.5 year

4.3.4. Vector Autoregression Estimates

Vector Autoregression Estimates

Date: 10/14/18 Time: 10:01

Sample (adjusted): 1972 2014

Included observations: 43 after adjustments

Standard errors in () & t-statistics in []

	REALGDP	FDI	DK	TRADE	LABOR	ODA	INFLATION
REALGDP(-1)	1.436064 (0.32638) [4.39995]	-0.006914 (0.04573) [-0.15120]	0.111683 (0.15739) [0.70958]	-0.004085 (0.13040) [-0.03132]	1.52E-09 (5.2E-10) [2.89986]	-5.64E-08 (2.7E-08) [-2.10109]	6.42E-09 (1.5E-08) [0.42058]
REALGDP(-2)	-0.340210 (0.35135) [-0.96829]	-0.035528 (0.04922) [-0.72176]	-0.034418 (0.16943) [-0.20313]	-0.008929 (0.14038) [-0.06361]	-1.23E-09 (5.6E-10) [-2.19317]	5.37E-08 (2.9E-08) [1.85571]	-1.45E-08 (1.6E-08) [-0.88411]
FDI(-1)	-0.143967 (1.39717) [-0.10304]	0.290997 (0.19574) [1.48664]	-1.065763 (0.67376) [-1.58181]	-1.863225 (0.55821) [-3.33784]	3.93E-09 (2.2E-09) [1.75532]	-4.63E-08 (1.1E-07) [-0.40277]	-3.68E-08 (6.5E-08) [-0.56309]
FDI(-2)	2.594883 (1.98345) [1.30827]	-0.348292 (0.27788) [-1.25339]	0.371361 (0.95648) [0.38826]	0.502012 (0.79245) [0.63349]	-4.88E-09 (3.2E-09) [-1.53728]	-1.39E-07 (1.6E-07) [-0.84855]	8.74E-08 (9.3E-08) [0.94132]
DK(-1)	-0.575427 (0.46868) [-1.22775]	0.008799 (0.06566) [0.13400]	0.683262 (0.22601) [3.02309]	-0.072737 (0.18725) [-0.38844]	5.57E-10 (7.5E-10) [0.74197]	4.06E-08 (3.9E-08) [1.05333]	1.56E-08 (2.2E-08) [0.71097]
DK(-2)	-0.006697 (0.36791) [-0.01820]	-0.009704 (0.05154) [-0.18827]	-0.117156 (0.17742) [-0.66034]	0.036025 (0.14699) [0.24508]	1.15E-09 (5.9E-10) [1.95179]	-9.60E-10 (3.0E-08) [-0.03170]	-1.27E-08 (1.7E-08) [-0.73880]
TRADE(-1)	1.080074 (0.51733) [2.08780]	0.173051 (0.07248) [2.38767]	1.311493 (0.24947) [5.25708]	1.099006 (0.20669) [5.31721]	-2.45E-09 (8.3E-10) [-2.96213]	-4.94E-08 (4.3E-08) [-1.16105]	3.18E-08 (2.4E-08) [1.31144]
TRADE(-2)	-0.541382 (0.88653) [-0.61067]	0.191587 (0.12420) [1.54254]	-0.539494 (0.42751) [-1.26193]	0.361472 (0.35420) [1.02054]	-1.51E-09 (1.4E-09) [-1.05994]	1.12E-08 (7.3E-08) [0.15325]	-3.34E-08 (4.1E-08) [-0.80502]

LABOR(-1)	-1.98E+08 (6.4E+07) [-3.10862]	18921498 (8937511) [2.11709]	-64680097 (3.1E+07) [-2.10248]	21101750 (2.5E+07) [0.82791]	1.863522 (0.10219) [18.2361]	15.75574 (5.25042) [3.00085]	6.886105 (2.98579) [2.30630]
LABOR(-2)	1.98E+08 (5.8E+07) [3.43036]	-16078671 (8089493) [-1.98760]	57961339 (2.8E+07) [2.08159]	-8372890. (2.3E+07) [-0.36294]	-0.919073 (0.09249) [-9.93669]	-12.92862 (4.75225) [-2.72053]	-6.331955 (2.70249) [-2.34301]
ODA(-1)	11884428 (4219029) [2.81686]	-165643.0 (591082.) [-0.28024]	4214416. (2034557) [2.07142]	-688609.2 (1685639) [-0.40852]	0.011530 (0.00676) [1.70608]	-0.493964 (0.34724) [-1.42256]	0.053128 (0.19746) [0.26905]
ODA(-2)	-1229372. (3342332) [-0.36782]	-341440.8 (468257.) [-0.72917]	68567.52 (1611784) [0.04254]	-133188.0 (1335370) [-0.09974]	-0.020851 (0.00535) [-3.89453]	0.133640 (0.27508) [0.48582]	-0.242392 (0.15643) [-1.54950]
INFLATION(-1)	3493328. (3840671) [0.90956]	-322682.5 (538074.) [-0.59970]	1439159. (1852100) [0.77704]	364096.8 (1534473) [0.23728]	0.004016 (0.00615) [0.65279]	-0.135811 (0.31610) [-0.42965]	0.365452 (0.17976) [2.03304]
INFLATION(-2)	-3255574. (3663864) [-0.88856]	-518538.1 (513304.) [-1.01020]	-630902.6 (1766837) [-0.35708]	185710.4 (1463832) [0.12687]	-0.002336 (0.00587) [-0.39796]	0.143824 (0.30155) [0.47696]	-0.237565 (0.17148) [-1.38537]
C	-2.34E+08 (7.9E+08) [-0.29701]	-1.05E+08 (1.1E+08) [-0.94712]	1.54E+08 (3.8E+08) [0.40626]	-6.41E+08 (3.1E+08) [-2.03530]	2.648890 (1.26185) [2.09921]	-114.4335 (64.8336) [-1.76503]	-7.229756 (36.8693) [-0.19609]
R-squared	0.990644	0.946519	0.990913	0.980563	0.996185	0.612684	0.463256
Adj. R-squared	0.985966	0.919778	0.986370	0.970844	0.994278	0.419026	0.194884
Sum sq. resids	4.79E+17	9.40E+15	1.11E+17	7.65E+16	1.229164	3244.834	1049.351
S.E. equation	1.31E+08	18324808	63075619	52258421	0.209520	10.76508	6.121832
F-statistic	211.7664	35.39632	218.1052	100.8944	522.2990	3.163740	1.726172
Log likelihood	-855.4253	-770.9129	-824.0643	-815.9746	15.41525	-153.9722	-129.7010
Akaike AIC	40.48490	36.55409	39.02625	38.64998	-0.019314	7.859171	6.730279
Schwarz SC	41.09927	37.16846	39.64062	39.26435	0.595058	8.473543	7.344651
Mean dependent	2.03E+09	34265249	4.64E+08	2.74E+08	51.54089	18.42750	8.570822
S.D. dependent	1.10E+09	64698352	5.40E+08	3.06E+08	2.769841	14.12338	6.822637

4.3.4. Lag Selection

VAR Lag Order Selection Criteria

Endogenous variables: REALGDP FDI DK TRADE LABOR ODA INFLATION

Exogenous variables: C

Date: 10/14/18 Time: 10:10

Sample: 1970 2014

Included observations: 42

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3743.348	NA	8.56e+68	178.5880	178.8776	178.6941
1	-3467.420	446.7397	1.79e+64	167.7819	170.0988*	168.6311
2	-3397.306	90.14719*	8.00e+63	166.7765	171.1206	168.3688
3	-3328.805	65.23894	5.63e+63*	165.8479*	172.2193	168.1832*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The above results show that the minimum lag selection is lag 2 in order to continue with further testing

4.3.5. Test of Normal Distribution

VAR Residual Normality Tests
 Orthogonalization: Cholesky (Lutkepohl)
 Null Hypothesis: Residuals are multivariate normal
 Date: 10/14/18 Time: 10:17
 Sample: 1970 2014
 Included observations: 43

Component	Skewness	Chi-sq	df	Prob.*
1	-1.640856	19.29560	1	0.0000
2	-1.766865	22.37298	1	0.0000
3	0.259587	0.482931	1	0.4871
4	0.502165	1.807219	1	0.1788
5	0.150853	0.163090	1	0.6863
6	0.051988	0.019370	1	0.8893
7	0.524758	1.973491	1	0.1601
Joint		46.11468	7	0.0000

Component	Kurtosis	Chi-sq	df	Prob.
1	8.923361	62.86279	1	0.0000
2	10.37873	97.54842	1	0.0000
3	2.680349	0.183066	1	0.6688
4	4.025548	1.884383	1	0.1698
5	3.755109	1.021589	1	0.3121
6	3.082363	0.012154	1	0.9122
7	4.590233	4.530839	1	0.0333
Joint		168.0432	7	0.0000

Component	Jarque-Bera	df	Prob.
1	82.15840	2	0.0000
2	119.9214	2	0.0000
3	0.665997	2	0.7168
4	3.691602	2	0.1579
5	1.184679	2	0.5530
6	0.031524	2	0.9844
7	6.504330	2	0.0387
Joint	214.1579	14	0.0000

*Approximate p-values do not account for coefficient estimation

Basing of the above results, the variables are normally distributed the p value is 0.0000

4.3.6. Test of Autocorrelation

VAR Residual Serial Correlation LM Tests

Date: 10/14/18 Time: 10:23

Sample: 1970 2014

Included observations: 43

Null
hypothes:
No serial
correlation
at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	55.32174	49	0.2483	1.153667	(49, 80.6)	0.2811
2	52.82496	49	0.3286	1.087340	(49, 80.6)	0.3641
3	52.32919	49	0.3460	1.074358	(49, 80.6)	0.3819

Null
hypothes:
No serial
correlation
at lags 1 to
h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	55.32174	49	0.2483	1.153667	(49, 80.6)	0.2811
2	102.3459	98	0.3619	0.966022	(98, 59.5)	0.5665
3	267.5539	147	0.0000	2.213037	(147, 17.6)	0.0283

*Edgeworth expansion corrected likelihood ratio statistic.

At lag 1, the autocorrelation is at 28% which is fair for analysis.

4.3.7. Test of Homoskedasticity

VAR Residual Heteroskedasticity Tests (Levels and Squares)

Date: 10/14/18 Time: 10:33

Sample: 1970 2014

Included observations: 43

Joint test:

Chi-sq	df	Prob.
873.2577	784	0.0142

Individual components:

Dependent	R-squared	F(28,14)	Prob.	Chi-sq(28)	Prob.
res1*res1	0.903580	4.685620	0.0019	38.85392	0.0833
res2*res2	0.964994	13.78318	0.0000	41.49473	0.0483
res3*res3	0.945751	8.716693	0.0001	40.66728	0.0576
res4*res4	0.790583	1.887577	0.1058	33.99506	0.2010
res5*res5	0.937991	7.563408	0.0001	40.33363	0.0617
res6*res6	0.894767	4.251360	0.0032	38.47498	0.0897
res7*res7	0.546938	0.603602	0.8758	23.51834	0.7067
res2*res1	0.883876	3.805746	0.0056	38.00667	0.0983
res3*res1	0.905271	4.778196	0.0017	38.92664	0.0821
res3*res2	0.901406	4.571311	0.0022	38.76047	0.0849
res4*res1	0.857541	3.009788	0.0168	36.87427	0.1217
res4*res2	0.946154	8.785741	0.0001	40.68462	0.0574
res4*res3	0.925442	6.206191	0.0004	39.79401	0.0690
res5*res1	0.860364	3.080751	0.0151	36.99567	0.1190
res5*res2	0.932852	6.946220	0.0002	40.11263	0.0646
res5*res3	0.912531	5.216282	0.0011	39.23881	0.0772
res5*res4	0.921894	5.901525	0.0006	39.64143	0.0711
res6*res1	0.893106	4.177530	0.0035	38.40356	0.0910
res6*res2	0.894680	4.247450	0.0032	38.47125	0.0898
res6*res3	0.900600	4.530158	0.0023	38.72578	0.0854
res6*res4	0.893008	4.173245	0.0035	38.39934	0.0911
res6*res5	0.893285	4.185383	0.0035	38.41126	0.0909
res7*res1	0.593779	0.730858	0.7677	25.53251	0.5987
res7*res2	0.699024	1.161260	0.3957	30.05801	0.3604
res7*res3	0.826618	2.383800	0.0449	35.54456	0.1546
res7*res4	0.681479	1.069756	0.4635	29.30361	0.3973
res7*res5	0.633654	0.864832	0.6421	27.24714	0.5048
res7*res6	0.837700	2.580721	0.0326	36.02112	0.1421

The results above shows the residuals mean and variances are not varying over time.

Table 6: Empirical results of economic growth of Rwanda

Dependent Variable: LOG(REALGDP)				
Method: Least Squares				
Date: 09/13/18 Time: 00:33				
Sample (adjusted): 1974 2014				
Included observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FDI)	0.025797	0.026392	1.177469	0.3345
LOG(DK)	0.227455	0.056871	2.099457	0.0003
LABOR	0.049221	0.009885	1.979585	0.0612
ODA	0.008595	0.002691	2.11.1936	0.0028
INFLATION	-0.006581	-0.002930	-2.245763	0.0306
LOG(TRADE)	-0.063941	-0.069331	-2.364615	0.0733
C	11.86954	0.537172	22.09635	0.0000
R-squared	0.942728			

Source: Estimated By Author Using E-Views 10

REALGDP	= 11.86	+ 0.025fdi	+0.227dk	+0.049labor	-0.063 trade	+0.008oda	-0.006 infl	+ ε_{it}
Std. Error	0.537	0.0263	0.0568	0.0098	-0.0693	0.0026	-0.0029	
T-Statistic	22.09	0.9774	2.0994	1.9795	-2.3646	-2.11.19	-2.2457	
Prob	0.0000	0.3345	0.0003	0.0612	0.0733	0.0028	0.0306	

The table above shows the results from regression equation .the result shows that the Official Development Aid has a positive and statistically significant impact on economic growth at 95% confidence level. Trade has negative impact on economic growth but not statistical significant. According to Krugman and Obstfeld(2006),the trade openness benefits by the large economies than small economies because the small economies affect insignificantly the world demand ,supply and hence price levels.Thus,the negative impact comes from country trade deficit.

Rwanda exports the untransformed limited number of agricultural and mines while the country spends much money to import raw materials and consumption items as well.

Furthermore the study revealed the inflation has negative but no statistical significant relationship between inflation and economic growth.

According to (Todaro and Smith,2012)the inflation of less than 6% level a year induces investment and growth in short run but if the inflation continues for long time ,it may erode the confidence of the new investor to enter and demotivate the expansion of the existing business.

Another growth determinant we analysed was the labor force which has a positive impact but not statistically significant. General labor is available, but Rwanda suffers from a shortage of professional workers and technicians. Indeed most of the labor forces (unskilled) are concentrated in agriculture sector which contributes to 40% national GDP however their contribution is hardly measured yet they are recognized.

Foreign direct investment has a positive but not statistically significant impact on economic growth of Rwanda at 5% significance. The findings also reveal the complementarity between FDI and domestic investment toward the growth. Thus, We reject H₀ since test statistics shows that 95% confidence level FDI affects positively the economic growth in Rwanda yet we accept H₁.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

This chapter represents the summary of the major findings conclusion and the recommendation provided in the research about the impact of foreign direct investment on the economic growth in Rwanda and suggestion for further studies.

5.1. Summary of findings

The main objective of this study was to assess the impact of foreign direct investment on the economic growth in Rwanda over the period of 1970 to 2014. The test statistics was been done among them there are the Stationarity test ,Cointegration test ,Error correction model autocorrelation and below are the findings:

Stationarity test: the result of ADF test for unit root reveals that the series are satationary,since Real growth Domestic Product is stationary at 1^{sd} difference , Foreign Direct investment is stationary at 2^{sd} difference, Domestic Capital is stationary at 1^{sd} difference, LOBOR is stationary at 1^{sd} difference Official Development Aid is stationary at Level and INFLATION is stationary at level too.

Co integration test: the result for co integration test shows that there is REALGDP and FDI has the long run relationship.

The regression analysis results reveals Foreign direct investment has positive effect but not statistical significant on REALGDP .This is shown by the coefficient 0.025797.the result reveals that 1%increase in FDI will result 2.5797 increase of in REAL GDP.This means that FDI has a positive but not significant effect on economic of Rwanda. This result is line with the finding of Uwubanmwun and Ogiemudia (2016) and Thomas KIGABO and Joseph BARICAKO(2009) who all that FDI has the positive effect on economic growth. However the finding of this study is contrary to that of Levine(2002) and aitken (1999) who found an negative effect of FDI on economic growth.

The domestic capital has positive effect and statistical significant on REALGDP This is shown by the coefficient 0.227455 .The result reveals that1 % increase in Domestic capital will result 22.7% Increase of in REAL GDP .this means that domestic capital has a positive and significant effect on economic growth of Rwanda.

Official Development Aid has positive effect and statistical significant on REALGDP. This is shown by the coefficient 0.008595. The result reveals that 1 % increase in ODA will result 0.8% Increase of in REAL GDP .This means that ODA has a positive and significant effect on economic growth of Rwanda. R-square shows that the 94.2% of the change in dependent variable are explained by the independent variables in the model.

The hypothesis testing

H0: $\beta=0$, it means that Foreign direct investment has no effect on economic growth in Rwanda.

H1: $\beta \neq 0$, it Foreign direct investment has an effect on economic growth in Rwanda.

From the result of the regression analysis, Foreign Direct Investment has a positive effect on the Real Gross Domestic Product (REALGDP) which represent the economic growth, thus the null hypothesis is rejected. The alternative hypothesis which states that Foreign Direct Investment has a positive effect on economic growth in Rwanda is accepted.

5.2. Conclusion

The main objective of this study was to assess the impact of foreign direct investment on the economic growth in Rwanda for period of 1970 to 2014. Therefore, the study concluded that Foreign direct investment has a positive but not statistical significant effect on the economic growth of Rwanda .This is against the belief of some researchers that foreign direct investment has negative effect on economic growth.

5.3. Recommendation

Based other findings of this study, the recommendation were given:

1. The government should have to focus on the state infrastructure improvement that will meaningful attract more FDI.
2. The government is suggested that more attention should be paid to formulate policies that will maximize the benefits from FDI inflows. Otherwise multinationals will potentially profit that the country since there is not profit repatriation low.

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