Topics: Econometric Analysis of the Effect of Investment and External Aid on Economic Growth in Rwanda Period: [2000-2015]

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Abstract: *This work has been done on the effect of investment, external aid on economic growth of Rwanda within a period of 2000 up to 2015. The general objective of this study was to analyze econometrically the effect of investment and external aid on economic growth in Rwanda This study contains the following specific objectives: To analyze the trends of investment, external aid and economic growth in Rwanda, to find the relationships between investment, external aid and economic growth in Rwanda. The following hypotheses have been formulated: The investment and external aid have the same tendency in Rwanda, the investment and external aid have the same effect on economic growth in Rwanda. To make the research richer and understandable, quantitative approach was used in forms of figures for statistical analysis, secondary data were collected from different reports and internet websites and analyzed using Eviews 7 and excel in order to provide enough and adequate information about economic growth, investment, external aids and economic growth in Rwanda also have been used in order to test research hypotheses. According to the results we found that the first and second hypotheses of this research were verified and confirmed as indicated in figure 4 & 5 and table 5, 8, 11 and 13 proved that investment and external aid have the same tendency and same effect. The variables were significantly fit the model as it was shown by the R2 Adjusted –higher than 80% which shows strong goodness of fit in the long-run and short run estimated model. As conclusion even if we face the problem of multicolinearity, it doesn't affect the goodness of fit. But it cause one independent variable to switch the sign and became insignificant in other word it give a fake model as indicated in table 10 where external aid are affected in order to resolve this problem we remove one variable which is external aid and we still depend on investment. Investment has positive effect on economic growth in long-run and short run. Also investment and external aids are highly correlated as indicated in table 8 that is why they have same effect on economic growth. We recommend that the government of Rwanda should encourage the donors to change the form in which external aid comes which is in form of budget. Those external aids coming in form of budget are included in public investment that is why we face the problem of multicolinearty. Then donors might do this directly by supporting infrastructure, small farmers, building schools in order to resolve those problem and external aids have significant on economic growth.*

Keywords: *Economic growth, Econometric analysis, Investment, External aid*

1. INTRODUCTION

Various points to be discussed within the general introduction are the background of the study ,choice and interest of the study, problem statement, general and specific objectives, research questions and hypothesis of the study, overview of the research method, scope and the organization of the study.

1.1. Background of the Study

According to Romer in the first seven decades of the twentieth century, per capita GDP rose steadily while its distribution became somewhat less unequal, As a result, most citizens of most countries in industrialized world have become materially better off decades by decades and children have typically been substantially better off than their parents were at the same age, (Romer & Weil, 1992).

In the 1970, however, the engine of growth faltered, the growth rate felt and the distribution of income stopped becoming less unequal; as a result ,real income of some families remain constant and felt for some others, (Romer & Weil, 1992 p.8).

Although some countries like in America, china, Japan France still live in one of the richest societies in the history, many observers spoke of the end of the dreams that each generation would expect to be better-off than their predecessors, (Taylor, John B. 2003).The change in attitudes and perception brought about in the minds of ordinary, middle class citizens by the mere slowdown of the rapid growth shows how important a part that steady growth had played in people's minds and hearts over the decades of twentieth century, (Taylor, John B. 2003 p.10)

The world economy continued to slow down, decelerating from 3.4% in 2012 to 3.3% in 2013 following economic slowdown in USA and China. Burnside, C. and D. Dollar (2013). In its estimates of October 2014, IMF revised down the 2014 global economic growth from 3.7% projected in July, 2014 to 3.3%. This slowdown review is the result of weaker than expected performances of the first half of the year 2014 particularly on account of events in USA, Euro Area, Japan and some big emerging economies, (BNR(2013-2014), P.25).

However, driven by improving underlying fundamentals in developed countries and partly by a rebound in some emerging markets, the world economic growth have been improved by 3.8% end 2015. In line with these positive economic developments, the world trade growth is slightly recovering but remained well below the historical average growth, (BNR, Annual report 2013/ 2014, p.25).

Due to persistent spare capacity of production and softening commodity prices, world inflationary pressures are expected to remain low over the near future. Consistently, monetary policy in major economies remained accommodative to boost the economic activity and to shift inflation closer to policy targets, (BNR, Annual report 2013/2014, p. 25).

Rwanda is located in East Africa, bordered by Uganda in north, Burundi in south, Tanzania in the east, and the Democratic Republic of the Congo in the west. (Kigabo Thomas, 2009) Rwanda remains an underdeveloped, agrarian economy with around 60percent of the population living below the poverty line. In 2006, GDP was comprised of agriculture (41 percent), services (39 percent), and industry (18percent). The economy of Rwanda is currently characterized by internal (budget deficit) and external (balance of payments) macroeconomic disequilibria, low savings, and low investment rates. In addition, Rwanda's exports, composed mainly of tea and coffee, are subject to fluctuations on the international market and have not been able to cover import needs, (Kene,E. and Coulibaly k. (2006).

The 1994 genocide devastated the Rwandan economy as well as its population, GDP was halved in a single year, 80 percent of the population was plunged into poverty, and vast tracts of land and livestock were destroyed, the genocide also exacerbated a number of development constraints that existed before 1994, (Kigabo Thomas, 2009 p. 15) .The already poorly developed productive infrastructure was completely destroyed. Thus, the consequences of genocide have devastated Rwanda's social, political, and economic fabric, (Kigabo Thomas, 2009 p.15).

The country is still heavily dependent on external aid (45% of current expenditure in 2010) from the five general budget support donors (World Bank, European Union, African Development Bank, Germany and UK) and two sector budget support donors (the Netherlands and Belgium). Rwanda remains vulnerable to rising global oil prices such that a 10% rise in the price of oil costs Rwanda 1.5% of Gross Domestic Product (DFID Rwanda, 2012, p.2)

The investment activities of the public sector establish foundations for economic growth and development. Their impact comes from both direct and indirect effects either through increased employment and wages and the rise of productivity of the private sector. (MINECOFIN, 2000).

Therefore, for the Republic of Croatia as a transition economy with great infrastructure needs and the condition of high unemployment rates, it is important to maintain a high level of public investments. In addition, it is necessary to improve the institutional framework of the investment process in order to increase efficiency and boost positive effects. (MINECOFIN, 2000).

Since 2000, Rwanda has envisaged a set of policies with the expectations of transforming the agrarian subsistence economy into a sophisticated knowledge based society. These policies are defined in a

framework so called "Vision 2020."The main socioeconomic objectives of Vision 2020 include transforming Rwanda into a middle-income country, with per capita income of about US$900 (from

US$290 today), and transforming the structure of the economy such that the industrial and services sectors will take over so that by 2020. . (MINECOFIN, 2000).

It is expected that services will contribute 42 percent, industry 26 percent, and agriculture 33 percent of GDP. It is also expected that the population living under the poverty line will be reduced from 60 percent today to 25 percent by 2020, the population will grow on average rate by 2.7 percent a year until 2020, the literacy rate will increase from 48 percent (2000) to 90 percent in 2020, and average life expectancy will rise to 55 years from 49 years today) (MINECOFIN, 2000).

1.2. Problem Statement

In this study the researcher wants to analyze the effect of investment and external aid on economic growth in Rwanda and this research shows the trend of investment, external aid and GDP growth in Rwanda during the period 2000-2015. External aid may not contribute in significant way to the economic growth of Rwanda because of suspension and assistance to governments is dangerous (for example 1994) because it increases the power of the elite in the recipient governments, leads to corruption, to spend money in unproductive activity and hinders economic growth. And that pushed the researcher to assess the effect of investment and external aid on economic growth in Rwanda. However, External aid does not contribute in significant way to the economic growth of developing countries. The aid which was supposed to promote economy may give the opportunity for some of regimes to spend money in unproductive activities and assistance to governments is dangerous because it increases the power of the elite in the recipient governments, leads to corruption and hinders economic growth. In particular, that aid discourages the growth of private sector investments, encourages public sector-led growth (since aid is in fact money added to government coffers) thereby limiting growth and inhibiting development,(Friedman (1958) and Bauer (1972)). Aid is lost in countries that have no technical or administrative skills and use it inappropriately. Examples of roads built and unused, or other projects that destroy more than they create, unproductive resources, are not uncommon,(Amarda. R, 2014).

External aids in Rwanda sometime have negative impact on economic growth of Rwanda because of suspension. The country is actively trying to reduce its dependency on foreign funds due to its "unpredictability, Moyo, Dambusa (2013). Some criticize external donors' unreliability, calling "the suspension of funds already promised and grossly betrayal" (The pain of suspension). There is no legal obligation for nationals to own shares in external investments or requirement that shares of external aid equity be reduced over time. The country needs to continue its efforts to become less dependent on external donors by implementing policies to strengthen its domestic economy, which increase the government's accountability and reduce oppressive policies, (Edmund Blair and Jenny Clover (2014).

Rwanda still has challenges in building its institution capacity, governance including the management of public resources remains insufficient due to lack of sound institutions and competent personnel, lack of adequate trained people in agriculture and animal husbandry hamper the modernization in this sector, (kigabo thomas, 2009).

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Despite the improvements in economic performance, Rwanda continues to be confronted with a number of constraints, including low level of savings and investment to fuel the growth needed to raise living standards, reduce poverty and generate sufficient productive employment, in other words, for self-sustained growth, (Jean R.(2008).

Different macroeconomic indicators show clearly that the Rwandan government has been mostly concerned by reorganizing all sectors of the economy, and that a lot has been achieved. From 1990 to 1994, the economic growth rate was negative, except in 1991. However, the growth of GDP was positive in several years after 1994 and seems to have become more stable since 2004. Indeed, after a record growth rate of 11 percent in 2002 due to very good rains and an exceptional harvest of subsistence crops, there was a serious setback in 2003 due to drought, which affected agriculture very seriously. Growth fell to 0.3 percent. But from 2004 to the present, economic growth has been relatively sustainable and varies between 5 and 7 percent, (Jean R.(2008).

The country is still heavily dependent on external aid (45% of current expenditure in 2010) from the five general budget support donors (World Bank, European Union, African Development Bank, Germany and UK) and two sector budget support donors (the Netherlands and Belgium). Rwanda remains vulnerable to rising global oil prices such that a 10% rise in the price of oil costs Rwanda 1.5% of Gross Domestic Product (DFID Rwanda, 2012, p.2)

The above highlighted challenges faced by Rwandan economy have pushed economic growth in Rwanda to fluctuate over time and grow at slow pace.

That's why the researcher attempted to analyze econometrically the effect of investment and external aid on economic growth in Rwanda with the aim of finding out which factors among public investment and external aid seems to contribute significantly to the economic growth and show the relationship that exist among economic growth, public investment and external aid, then it also necessary to known the amount of public investment and external aid in Rwanda, after the researcher will provide recommendations to police markers to what should be done to sustain economic growth rate and ensures that the growth rate expected in the vision 2020 will be achieved so Rwandans may benefit from it.

That is why the researcher asked the following questions:

1. Do investment and external aid have the same tendency in Rwanda?
2. Do investment and external aid have the same effect on economic growth in Rwanda?

1.3. Objectives of the Study

This study has two types of objectives: general and specific objectives.

General Objective

The general objective of the study was to analyze econometrically the effect of investment and external aids on economic growth in Rwanda.

Specific Objectives

This study contains the following specific objectives:

- To analyze the trends of investment, external aid and economic growth in Rwanda.
- To find the relationships between investment, external aid and economic growth in Rwanda.

Research Hyp otheses

A hypothesis as provisional answer to the research questions that should be tested before their confirmation or information. The following hypotheses have been formulated:

- The investment and external aid have the same tendency in Rwanda.
- The investment and external aid have the same effect on economic growth in Rwanda.

Research Methodology

This chapter provides detailed information on how the study was carried out. It is a presentation and a description of the methods and techniques used to carry out the research. The chapter also spells out the techniques and methods of data collection, data presentation, data processing and data analysis. In addition, this chapter describes study area and study design.

2. RESULTS PRESENTATION AND DISCUSSION

The chapter deals with analysis of the data, interpretation and discussion of the results of data collected from secondary sources in order to come up with an appropriate conclusion.

The aim of our research was to analyze econometrically the effect of investment and external aid on economic growth. To meet the objective of the research, we tried to show the trend of the variables under study, Stationality test was first performed to make sure that all variables included in the model are stationary in order to have consistent results and avoid spurious regressions and the researcher has also tried to analyze long run and short run relationship that exists among economic growth and those two variable such as investment and external aid using time series data from 2000 to 2015 by means of cointegration and error correction model test . In our model we have three variables such as investment, external aid and GDP has been used as a measure of economic growth as it said in the literature review. In addition, it is in this part where the researcher performed the diagnostic test to see whether the regression is meaningful.

3. ANALYSIS AND PRESENTATION OF THE RESULTS

The Trend between Gross Domestic Product, investment and external aid in Rwanda

3.1. Evolution of Gross Domestic Product in Rwanda from 2000 Up To 2015

The evolution of Gross domestic product from 2000 to 2015 is explained by both table and its graphical representation as indicated below:
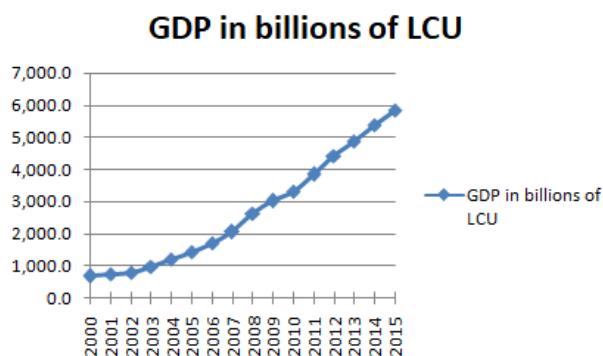

Fig1. *Graphical representation of the evolution Gross Domestic Product and its trend from 2000 up to 2015*

From the figure1 above this shows the trend of GDP from 2000 up to 2015.The GDP increased respectively on upward trend from 2000-2015. This means that Rwandan economies has been improved and develop considerably through government policies implemented in different sector of activities. This implied that different macroeconomic indicators show clearly that the Rwandan government has been mostly concerned by reorganizing all sectors of the economy, and that a lot effort has been putted. The growth of GDP was positive in several years and seems to become more increased than stable. From 2000 up to 2002, Gross Domestic Product was increasing slowly because the economy was still in the recovery and There are different years where GDP increased in high percentage in 2002 up to 2015 GDP grew at high rate that why an upward trend becomes more stip, GDP grew significantly due to external aids, investment and government policies all economic sector activities, and good performance of service sector, and the performance of this sector was encouraged by wholesale and trade as well as real estate's that has grown significantly.
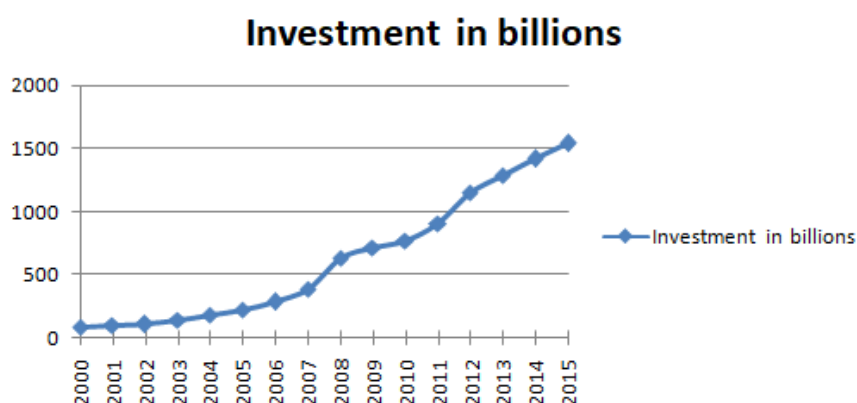

Fig2. *Graphical representation of investment From 2000 up to 2015*

From the figure 2 above this shows the trend of investment from 2000 up to 2015. Investment increased because some of the facilities such as roads, bridges, and harbors are usually provided directly by governments. The growth of investment was positive in several years and seems to become more increased than stable. From 2000 up to 2006, investment increased slowly because of lower foreign demand to the domestic products and also due to the economic recovery.

From 2006 up to2015, investment increased highly improvement in telecommunications, rails, and air services can be provided by private societies, which creating human capital and essential to create high standard of living, this requires general education, trade schools, and other appropriate institutions for formal education as well as policies to increase.

The necessity and importance of investments in the economic life, and not only, though extrapolation even talking about their importance for the development of human community, firstly derives from the fact that main engine for development and economic recovery is represented by level of investment. The performance of capital investment, viewed in volume, leads to the economic increase, by increasing the goods and services. The role of investment in economic recovery derives also from the fact that they are for the factor for the stimulation of demand and tender on the market.

The demand from the entity that performs investment, and the tender from the connected entities that can offer the goods and services necessary for the capital investment performance. As conclusion, the investment performance attracts incomes for the entities that implement it, but also incomes for the entities that participate to the capital investment by offering goods and services. Investment contributes to current demand of capital goods, thus it increase domestic expenditure.

entities that participate to the capital investment by offering goods and services. Investment contributes to current demand of capital goods, thus it increase domestic expenditure.

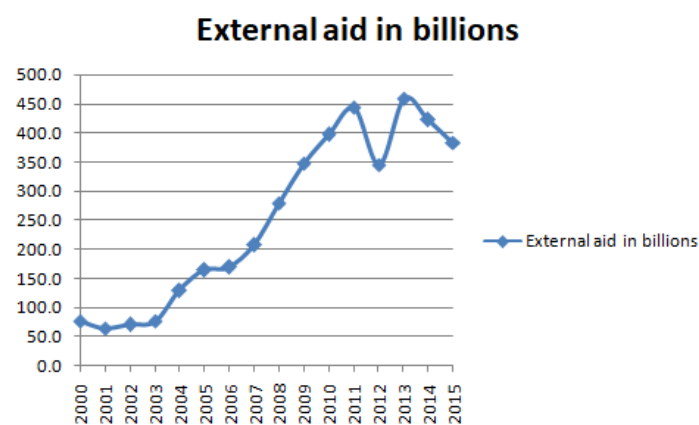### 3.2. Evolution of external aid in Rwanda from 2000 up to 2015

Fig3. Graphical representation of external aid from 2000 up to 2015

Source: *The researcher's calculations based on the appendix1*

From the figure 3 above this shows external aids from 2000 up to 2015 in case of Rwanda. The points which are visible to everyone are that external is not increased respectively considering the estimation years from 2000-2015. The year external aids increased is where the government analysis found that external is necessary on economic development of Rwanda with aims of budget support. Then, where external is reduced is where the government has formulated a medium term strategy which called Economic Development and Poverty Reduction Strategy. (EDPRS2). This includes economic transformation, rural development, productivity, youth employment and accountable governance. The aid is generally focused on the growth of modern sector. Therefore it increases the gap in living standards between the rich and the poor in some country situation. External aid in physical and human capital; increases the capacity to import capital goods or technology.

Considering the table above and figure external aid does not have indirect effects that reduce investment or savings rates; and aid is associated with technology transfer that increases the productivity of capital and promotes endogenous technical change.
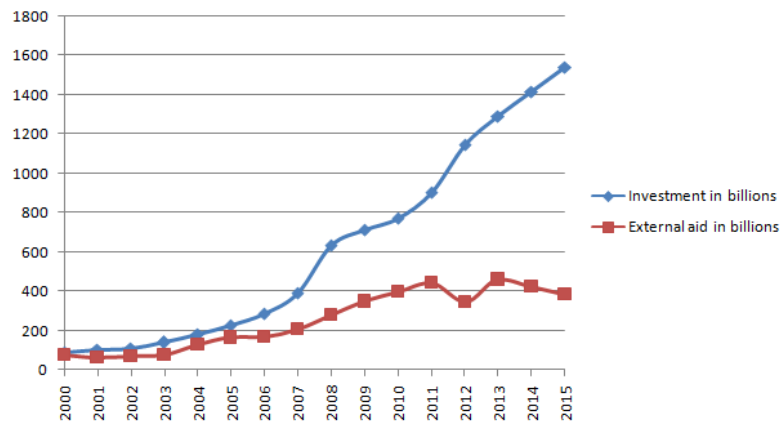
Fig4. Graphical representation of external aid and investment in Rwanda from 2000 up to 2015

From the figure 4 above this shows comparison between external aids and investment from 2000 up to 2015 in case of Rwanda. Investment increase on upward trend while external reduced in case of some years. The investment activities establish foundations for economic growth and development. The investment and external aid have not the same tendency in Rwanda. Their impact comes from both direct and indirect effects either through increased employment and wages and the rise of productivity of the private sector. External aid does not contribute in significant way to the economic growth of developing countries. The aid which was supposed to promote economy may give the opportunity for some of regimes to spend money in unproductive activities.
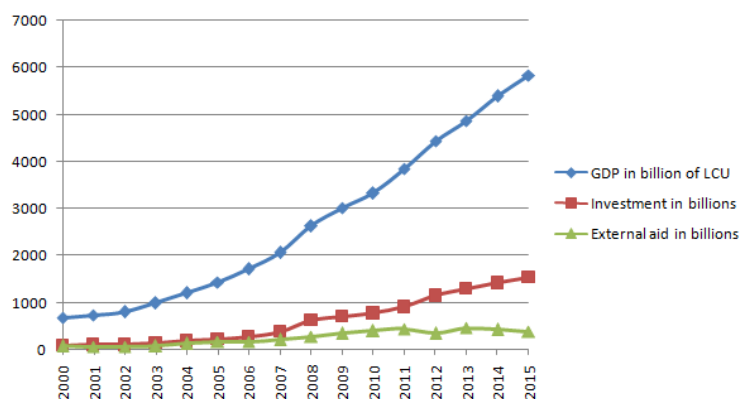

Fig5. Graphical representation of GDP, external aid and investment in Rwanda from 2000 up to 2015

The relationship between GDP,external aids and investment where it was increased from 2000 up to 2015. They 2003, 2007, 2008 and 2012 investment increased at high percentage because improvement in telecommunications, rails, and air services can be provided by private societies, which creating human capital and essential to create high standard of living, this requires general education, trade schools, and other appropriate institutions for formal education as well as policies to increase. This implied that different macroeconomic indicators show clearly that the Rwandan government has been mostly concerned by reorganizing all sectors of the economy, and that a lot effort has been putted.The growth of GDP was positive in several years and seems to become more increased than stable.

3.3. Model Specification

According to Bertalanffy, (1968), economic growth is an organized collection of parts (or subsystems) that are highly integrated to accomplish an overall goal. The system has various inputs, which go through certain processes to produce certain outputs, which together, accomplish the overall desired goal for the system. Rwanda actually considers investment to be the main statistic on which to rely when calculating the GDP. The main relationship between GDP and investment is the fact that a rise in the level of investment translates to a corresponding rise in the of GDP. Economic growth is an expansion of production measures as in real GDP over period. Economic growth is an increase in the amount of the goods and services produced by economy over time. It is conventionally measured as the percent rate of increase in real GDP. Growth usually calculated in real terms, i.e inflation adjusts

terms, in order to net out the effect of inflation on price of goods and services produced. In economics "economic to start investments in the country. "Economic growth" typically refers to growth potential output, i.e. production at "full employment", which caused by aggregate demand or observed output. The Researcher specifies the economic growth function in Rwanda. The model comprises one equation, the model that we develop here, on econometric analysis to the effect of investment and external aid on economic growth in Rwanda. A number of variables and annually adjusted data were used. Consequently we have the following equation.

It Expressed as Follow:

GDP= β_0 + β_1 INV+ β_2 EXA + $\mathcal{E}_t$ where

β_0 is the Intercept.

β_1, and $\beta 2$ are coefficients in the model of regression.

$\mathcal{E}_t$ is Error term at period t.

GDP_t is Gross Domestic Product

INV is Investment

EXA is External Aids

β_1 and $\beta 2$>0: This means that independents variables **INV** and **EXA** are positively related to dependent variable GDP_t.

β_1 and $\beta 2$ <0: This means that independents variables **INV** and **EXA** are negatively related to dependent variable GDP_t.

3.4. Data

The researcher used the data from BNR with references to the year from 2000 -2015.This study employs annual time series data of the following variables: GDP in billions Rwanda francs investment in billions of Rwandan francs, external aid in millions of Rwandan francs . The data set spanning the period 2000-2015 are collected from BNR (2015) from various documents published by the National Bank of Rwanda (Statistical Reports, Annual Reports) .

3.5. Coefficient of Correlation between Variables

Correlation coefficient measure the strength of association between two variables. The most common correlation coefficient called the Pearson product- moment correlation coefficient, measures the strength of the linear association between variables. The sign and the absolute value of correlation coefficient describe the direction and magnitude of the relationship between two variables.

The value of correlation coefficient ranges between -1 and 1, the greater the absolute value of correlation coefficient, the stronger the linear relationship. The weakest linear relationship is indicated by the correlation coefficient closer to 0, the positive correlation means that if one variable get bigger the other variable tends to get bigger and the negative correlation means that if one variable get bigger, the other variable tends to get smaller.

Table5. *Correlation matrix*

	LGDP	LINV	LEXA
LGDP	1.000000	0.998375	0.942625
LINV	0.998375	1.000000	0.951642
LEXA	0.942625	0.951642	1.000000

Source: *E-views 7.0*

From the above table the researcher found that, each pair of two different variables has a positive relationship between them and as their correction coefficient is closer to 1, this means that they have a strong relationship. The table also shown that, the variables are different each other.

3.6. Test and Analysis of the Data

In this research, we used time series data for the period 2000 up to 2015 and famous test used in econometrics have been performed. The first test performed by the researcher was stationality test. It is clear that most of macroeconomic time series data are not stationary. When dependent and independent variables in time series data are non-stationary, a non-sense regression or spurious regression model is likely to occur. The R-square is high but combined with low Durbin Watson statistic, and as a consequence the coefficients seem to be statistically significant while they aren`t. this case can mislead the economic interpretation. In order to avoid obtaining misleading statistical inferences, the researcher performed the stationality test of all variables used in the model

The long run estimated equation has been elaborated using Eviews7 to see whether there is any relationship that exist between GDP and its expected determinants after testing the significance of the coefficients estimated, the co-integration test was performed to see whether there is a long run relationship between GDP and its expected determinants, the ECM (Error correlation model) was performed to test whether there is a short run relationship between GDP as dependent variable and independent variables which are investment and external aids and make sure that errors founded in our model are collected, the Diagnostic test including stability test and residual test to make sure that the estimators in our model are BLUE (Best Unbiased Estimator).

The variables can be stationary at different level of significance, these are shown by the number of stars where:

(*): stationary at 10%

(**): stationary at 5%

(***): stationary at 1%

Table6. *Stationary test of the series at level*

STATIONARITY AT LEVEL								
SERIES	MODEL	ADF				PP		CONCLUSION
		LAG	τt,τ, τμ	φ 3, φ1	T	LAG	τt,τ, τμ	
LGDP	Constant and trend	0	-0.21	0.68	-0.21	2	-0.58	**GDP** is not stationary at level
	Constant	0	-1.21	1.46	-1.21	2	-1.10	
	None	1	1.49	-	1.49	2	7.05	
LINV	Constant and trend	0	-0.76	0.61	-0.76	2	-1.12	**INV** is not stationary at level
	Constant	0	-0.91	0.82	-0.91	2	-0.86	
	None	0	5.64	-	5.64	2	4.56	
LEXA	Constant and trend	0	-0.57	0.80	-0.57	2	-0.41	**EXA** is not stationary at level
	Constant	0	-1.30	1.70	-1.30	2	-1.30	
	None	0	1.02	-	1.02	2	1.03	

Hint: **(*):** stationary at 10%

(**): stationary at 5%

(***): stationary at 1%

Table7. *The stationary at the First Difference*

STATIONARITY AT THE FIRST DIFFERENCE								
SERIES	MODEL	ADF				PP		CONCLUSION
		LAG	τt, τ, τμ	φ 3, φ1	T	LAG	τt, τ, τμ	
DLGDP	Constant and trend	1	-4.95**	13.66	-4.95**	2	-5.08***	GDP is stationary at the first difference
	Constant	0	-4.19***	17.57	-4.19***	2	-4.31***	
	None	0	-4.38***	-	-4.38***	2	-4.52***	
DLINV	Constant	0	-4.19**	8.83	-4.19**	2	-7.63***	INV is

	and trend							stationary
	Constant	0	-4.06***	16.48	-4.06***	2	-5.03***	at the first difference
	None	0	-4.24***	-	-4.24***	2	-5.36***	
DLEXA	Constant and trend	1	-4.97**	15.19	-4.97**	2	-10.79***	EXA is stationary
	Constant	2	-4.38***	18.35	-4.38***	2	-7.19***	at the first
	None	3	-4.62***	-	-4.62***	2	-7.06***	difference

Source: *Designed by the researcher from Eviews 7results.*

Hint :(*): stationary at 10%

(**): stationary at 5%

(***): stationary at 1%

Conclusion: According to the above results extracted from E-views 7, the researcher found that all series are non stationary at level but they become stationary after the first difference.

3.7. Test of Multicolinearity

Multicolinearity is a state of very high inter-correlations or inter-associations among the independent variables. It caused by the inclusion of a variable which is computed from other variables in the data set. If VIF (variance inflation factor) is greater than5 indicate high correlation which means we have the problem of multicolinearity.

Table8. *Test of Multicolinearity*

Variance Inflation Factors			
: 01/17/17 Time: 16:58			
Sample: 2000 2015			
Included observations: 16			
	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	0.010982	85.45173	NA
LINV	0.002459	711.3283	18.58193
LEXA	0.004795	1072.895	18.58193

From the above table the researcher found that, between investment and external aid that is a problematic because VIF (**18.58193**) are greater than 5. In order to resolve this problem we remove one of that independent variable.

3.8. Estimation of the Long Run Model

The long run equation shows the long run relationships in the model and e-views7 software provided the estimated long run equation as follows:

Table10. *Estimation of long run model Dependent Variable: LGDP*

Dependent Variable: LGDP			
Method: Least Squares			
Date: 01/12/17 Time: 17:12			
Sample: 2000 2015			
Included observations: 16			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.293710	0.104793	31.43052	0.0000
LINV	0.747331	0.049593	15.06936	0.0000
LEXA	-0.024531	0.069246	-0.354263	0.7288
R-squared	0.996784	Mean dependent var		7.659607
Adjusted R-squared	0.996289	S.D. dependent var		0.744368
S.E. of regression	0.045345	Akaike info criterion		-3.181655
Sum squared resid	0.026731	Schwarz criterion		-3.036794
Log likelihood	28.45324	Hannan-Quinn criter.		-3.174237
F-statistic	2014.515	Durbin-Watson stat		0.997682
Prob(F-statistic)	0.000000			

Source: *E-views 7*

Substituted Coefficients

LGDP = 3.29371005935 + 0.747331162551*LINV - 0.024531380734*LEXA

P Value   (0.0000)   (0.0000)   (0.7288)

R^2=0.996784

The regression result presented in Table 10, shows that the parameters are as expected except external aid. According to these results, the C, LINV are statistically significant as their respective probabilities **0.0000**, **0.0000** are less than critical value of 5% and in table 8 we face the problem of multicolinearity that cause one independent variable to became insignificant and the coefficient to switch the sign in other word they give a fake model. That is why external aid is not statistical significant as their probability (**0.7288**) is greater than 5 and their coefficient became negative; to resolve this problem we remove one of those independents variables which are external aid.

Table11. *Estimation of long run model Dependent Variable: LGDP after remove external   aid*

Dependent Variable: LGDP				
Method: Least Squares				
Date: 01/17/17 Time: 17:38				
Sample: 2000 2015				
Included observations: 16				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.266127	0.067914	48.09236	0.0000
LINV	0.730242	0.011140	65.55406	0.0000
R-squared	0.996753	Mean dependent var		7.659607
Adjusted R-squared	0.996521	S.D. dependent var		0.744368
S.E. of regression	0.043906	Akaike info criterion		-3.297047
Sum squared resid	0.026989	Schwarz criterion		-3.200473
Log likelihood	28.37638	Hannan-Quinn criter.		-3.292102
F-statistic	4297.334	Durbin-Watson stat		0.945095
Prob(F-statistic)	0.000000			

The regression result presented in Table 11, shows that the parameters are as expected. According to these results, the C, LINV are statistically significant as their respective probabilities **0.0000**, **0.0000** are less than critical value of 5% The **R^2=0.996753** and is greater than **0.5** and close to one showing that our model has a better goodness of fit.

- When **INV** increases by **1%,** then the **GDP** increased by **73%** and Ceteris paribus.

- When the variables in our model are considered to be zero, the GDP is explained by the value of the intercept C which is equal to **326.6%** (contribution of other variable not expressed inour model)**.**

So we conclude that based on the theory, these results is true because when investment increase, the Gross Domestic Product increase because of an increase in level of production and purchasing power (income).

Table12. *Co integration test*

Null Hypothesis: RESIDLR has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.150409	0.4800
Test critical values:	1% level		-4.728363	
	5% level		-3.759743	
	10% level		-3.324976	

Source: *Eviews 7*

According to the results from E-views 7, the ADF calculated is equal to -3.150409. The condition of co integration is that the residuals should be stationary, integrated of order 0: I(0) and the ADF calculated should be less that the Mackinnon values. In this case:

According to the results from E-views 7, the ADF calculated is equal to -3.150409. The condition of co integration is that the residuals should be stationary, integrated of order 0: I(0) and the ADF calculated should be less that the Mackinnon values. In this case:

The ADFcal= -3.150409> C (1%) = -3.9228

-3.150409 < C (5%) = -3.065

-3.150409 < C (10%) = -2.6744

This means that, the variables are co integrated at two levels. Means that they are co integreted at 5%, and at 10% level of significance. Then H_0 is accepted and then, the residuals are stationary at level I (0) means that the condition for estimating short run model satisfied.

3.9. Error Correction Model or Short Run Model

An error correction model is a dynamical system with the characteristics that the deviation of current state from its long run relationship will be fed into its short-run dynamic. An error correction model is a category of multiple time series model that directly estimates the speed at which a dependent variable returns to equilibrium after a change in an independent variable. It is also a theoretically-driven approach useful for estimating both long-run and short-run effects of a time series on another. ECM is useful model when dealing with integrated data, but can also be used with stationary data.

It makes easy interpretation of short run and long run effects and it can be estimated with OLS.

The E-views 7.0 is used to run the following ECM model

Estimation Equation:

DLGDP = C (1)*RESIDLR(-1) + C(2)*DLINV

Table13. *Error correction model*

Dependent Variable: DLGDP				
Method: Least Squares				
Date: 01/17/17 Time: 17:54				
Sample (adjusted): 2001 2015				
Included observations: 15 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.064186	0.012301	5.218055	0.0002
DLINV	0.420203	0.056141	7.484730	0.0000
R-squared	0.811652	Mean dependent var		0.143719
Adjusted R-squared	0.797164	S.D. dependent var		0.053287
S.E. of regression	0.023999	Akaike info criterion		-4.498045
Sum squared resid	0.007487	Schwarz criterion		-4.403638
Log likelihood	35.73534	Hannan-Quinn criter.		-4.499050
F-statistic	56.02118	Durbin-Watson stat		1.751131
Prob(F-statistic)	0.000005			

Source: *E-views7*

Substituted Coefficients:

DLGDP = 0.0641859681521 + 0.420203126547*DLINV

P-value   (0.0002)   (0.0000)

R^2 Adjusted=0.811652

Referring to the above short-run equation, Investment has positive effect on economic growth in short-run, the above result means that, if Investment increases one unit the economic growth increases 0.42 units which is 42% when other variable remain constant and then the investment affects positively economic growth of Rwanda in short-run. According to the above results, the researcher concludes that there is a short run relationship in our model, because the probability of independent variables is less than 5%. The error correction term is also positive (**RESIDLR$_t$ (0.0641859681521**) because we resolve the problem of multicolinearity by remove one variable. This is a good indicator that the correction of errors is possible. Basing on the value of the error correction term, the researcher

conclude that around 50% of all errors will be corrected in2.5 monthly14 days so around 100% of errors will be corrected in 5 monthly and 14days. The INV explain GDP as it respective probability 0.0000 is less than 5% level of significance. Adjusted R-squared =0.811652 or 81.1 % level of fitness which is better, this means that, in short run the variable fit at 81.1% level of fitness.
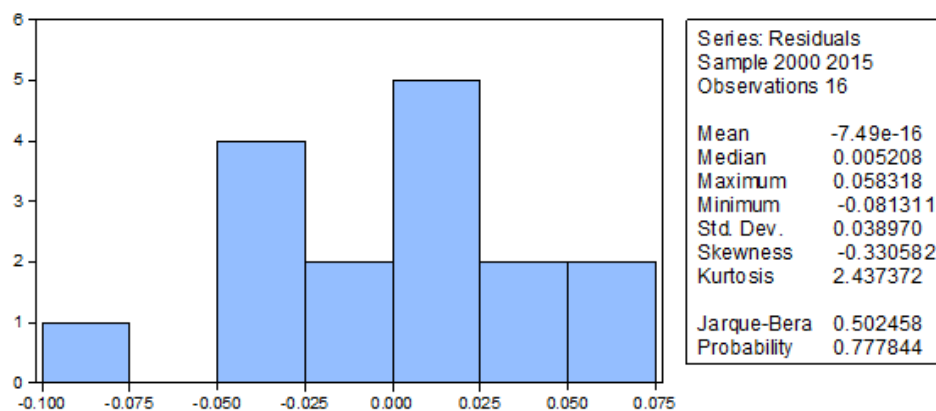

Fig6. *Normality test*

Source: *E-views 7*

From this table the probability of JARQUE-BERA is equal to **0.777844**, greater than 5%, so when the JARQUE-BERA probability is greater than critical probability 5% level of significance, the Ho is rejected. The residual are normally distributed. The normality of residuals shows that the residuals are stationary.

Table14. *BREUSCH-GODFREY serial correlation LM test*

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	4.415151	Prob. F(2,11)	0.0391
Obs*R-squared	7.124694	Prob. Chi-Square(2)	0.2804

Source: *E-views 7*

According to the above results, the researcher concludes that there is no serial correlation in the model; the probability is 28% means greater than 5%. The null hypothesis of the no serial correlation is accepted because the probability is greater than 5%.

Table15. *Heteroskedasticity Test*

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	2.337120	Prob. F(2,13)	0.1358
Obs*R-squared	4.231459	Prob. Chi-Square(2)	0.1205
Scaled explained SS	2.007596	Prob. Chi-Square(2)	0.3665

Source: *E-views 7*

According to the above results, the probability is equal 12% means that greater than 5%, so the null hypothesis is accepted. There is homoskedasticity; the variance of residuals of model under consideration is constant.

3.10.Correlogram squared residuals

The objective of this test is to show whether the model contains the problem of residuals. There is autocorrelation when the error of period t influences the error of the following period t+1. The probability of the errors in period t should be independent of the probability of the occurrence of errors in period t+1. The following are the hypothesis of the test:

Ho: Absence of autocorrelation of errors

H1: Presence of the autocorrelation of errors.

Table16. *Correlogram squared residuals*

Date: 12/30/16 Time: 16:22						
Sample: 2000 2015						
Included observations: 16						
Autocorrelation	Partial Correlation			AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	-0.011	-0.011	0.0024	0.961
. | . |	. | . |	2	0.003	0.003	0.0026	0.999
. |** . |	. |** . |	3	0.225	0.225	1.1242	0.771
. | . |	. | . |	4	-0.041	-0.037	1.1639	0.884
. **| . |	. **| . |	5	-0.231	-0.246	2.5587	0.768
. **| . |	.***| . |	6	-0.304	-0.402	5.2227	0.516
. | . |	. *| . |	7	-0.060	-0.095	5.3370	0.619
. | . |	. |* . |	8	-0.061	0.089	5.4715	0.706
. *| . |	. |* . |	9	-0.108	0.103	5.9554	0.744
. | . |	. | . |	10	-0.005	-0.059	5.9566	0.819
. | . |	. *| . |	11	0.042	-0.204	6.0559	0.870
. | . |	. *| . |	12	0.035	-0.180	6.1463	0.909

Source: *E-views 7*

The results confirm that there is no autocorrelation in the model because up to 12th lag the probability is greater than 5% critical value. this means that the null hypothesis is accepted and the alternative hypothesis is rejected. Then researcher concluded that, there is no autocorrelation of errors in different time.

3.11. Stability and Specification Tests

The stability tests are very crucial in econometrical methodology; and the stability condition is determinant in forecasting and policy purpose.

Stability Test

The stability test is done by the COSUM TEST. This test is based on the on the cumulative sum of recursive residuals. The cumulative sum is plotted with the 5% critical lines. The following figure was provided by E-views7.
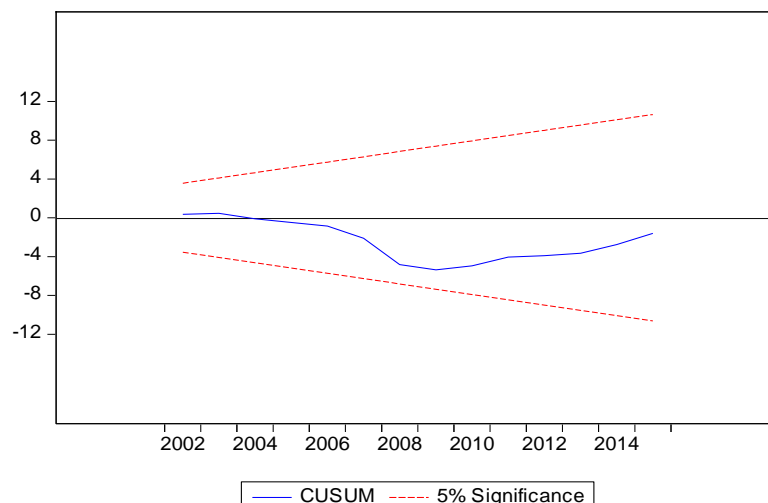

Fig7. *COSUM test for stability of parameters*

Source: *E-views 7*

The parameters are stable because the cumulative sum does not go outside the area of two critical lines at 5% significance. This test is very important in economics because when the parameters are stable, the predictions or forecasting are possible with the model. The results of all diagnostic testing given above show that the model is nice because all classical assumptions of normal linear regression are verified.

Ramsey Reset Test

There is error specification when some necessary variables are omitted in the model or there is adoption of wrong functional form of the model. This error can occur when the stochastic assumption is wrongly made. The model should be well specified to provide results which are not questionable for interpretation, for policy application and for forecasting. The RAMSEY RESET test is used to test the wrong specification of the model. These are the two hypotheses:

Ho: The model is correctly specified

H1: The model is not correctly specified

The following results are provide by the E-views 7

Table17. *RAMSEY RESET test*

Ramsey RESET Test:			
F-statistic	1.869742	Probability	0.196571
Log likelihood ratio	2.316847	Probability	0.127979

Source: *E-views 7*

According to the above results, the probability of the log likelihood ratio is equal to 0.127979 which is 12.7% greater than 5% level of significance. Hence, the null hypothesis is accepted and we rejected the alternative hypothesis. Thus our model is correctly specified.

4. DISCUSSION OF THE RESULTS

This part is concerned with discussion of the results according to the results presented and obtained. This part deals with the interpretation of those collected data from BNR and checks whether the given hypotheses has been verified. This part was very important in this research, the researcher shows us the findings of the research in relationship of the hypotheses given in the introduction of the work if it is validated or not. This presented work has the objective was to analyze econometrically the effect of investment and external aids on economic growth in Rwanda.

4.1. The Effect of Investment and External Aid on Economic Growth in Rwanda

Referring to Table 5 (Correlation matrix), the variables are different each other and they are positively correlated because, the coefficient of correlation is greater than zero and their correlation coefficient is closer to 1; this means that they have a strong relationship.

The long run estimated model indicated that, investment and external aid are fitting the model because The Adjusted R-square 0.99 which is 99%, at 5% level of significance means that, the variables fit the model 99 %, and then the goodness of fit is better even if we face the problem of multicolinearity, it doesn't affect the goodness of fit . And Investment and external aids have same effect on economic because are higher correlated as indicated in table 8 that is why we have the problem of multicolinearity, and we remove one variable which is external aid we still depend on other which is investment. Investment has positive effect on GDP because the coefficient of this variable is positive (0.73), Increase of independent variable when other variables remain constant, increases the economic growth. INV are statistically significant as their respective probabilities 0.0000 are less than critical value of 5% and in table 11.

In the short run, the results obtained after the performance of ECM test confirmed that investment have a positive effect on GDP as because the coefficient of this variable is positive (0.420203), Increase of independent variable when other variables remain constant, the probability of independent variable is less than 5%. The error correction term is also positive (RESIDLRt (0.0641859681521) because we resolve the problem of multicolinearity by remove one variable. This is a good indicator that the correction of errors is possible. Basing on the value of the error correction term, the researcher conclude that around 50% of all errors will be corrected in2.5 monthly14 days so around 100% of errors will be corrected in 5 monthly and 14days. The INV explain GDP as it respective probability 0.0000 is less than 5% level of significance. Adjusted R-squared =0.811652 or 81.1 % level of fitness which is better, this means that, in short run the variable fit at 81.1% level of fitness.

Then we conclude that investment and external aid have the same effect on economic growth in long-run and short-run.

4.2. Trend between Investment and External Aids on Economic Growth in Rwanda

According to the figure 4and 5, investment, external aid and GDP, all have the upward trends. Then the researcher concludes that, investment and external aid have the same trend with GDP in Rwanda from 2000 up to 2015. And also regarding on correlation matrix in table 5 investment, external aid and GDP as measure of economic growth all have the positive relationship which mean that both have the same trend.

4.3. Relationship between Investment, External Aid and Economic Growth of Rwanda

With the Results of correlation matrix in table 6 has indicated that each pair of two different variables has a positive relationship between them and as their correction coefficient is closer to 1, this means that they have a strong relationship. For multicolinearity test in table 8 has indicated that investment and external aid are higher correlated because VIF is greater than 5 then to resolve this problem of multicolinearity we remove one independent variable which is external aid because is affected with that problem by switching the sign and became insignificant as indicated in table 10, and we still depend on investment as indicated in table 11. With the Results of co integration test in table 12 has indicated that residuals are stationary at 5% and 10% level of significance and this pushed the researcher to conclude that there is a long run relationship between variables. in our study and this confirms that after the estimation of long run model, investment have a positive relationship with economic growth in Rwanda because its coefficient are positive and this implies that a variation of 1% increase of the variable INV leads to increase of GDP when other variables remain constant. And INV is statistically significance in long run and short run model.

4.4. Validation of the Hypotheses

The first hypothesis of this study was stated that," investment and external aid have the same tendency. And the second hypothesis of this study was stated that" investment and external aid have the same effect on economic growth of Rwanda" were verified by using different test which presented the results in tables.

The first has been verified and confirmed based to the figure 4and 5, investment, external aid and GDP, all have the upward trends. And also regarding on correlation matrix in table 5 the value of correlation coefficient ranges between -1 and 1, if the correlation coefficient has a negative value it indicates a negative relationship between the variable. This means that the variables move in opposite directions. The positive correlation has a positive value it indicates a positive relationship between the variable means that the variables move in same directions. Then in our study investment, external aid and GDP as measure of economic growth all have the positive relationship which means that both have the same tendency. Then the hypothesis of having the same tendency of investment, external aid and economic growth was confirmed and accepted.

The second hypothesis also has been verified and confirmed based on table 8 because investment and external aids are higher correlated which means that they have the same effect on economic growth. Also in table 8 we face the problem of multicolinearity because those independent variables are higher correlated where VIF (18.58193) is greater than 5.that problem cause one independent variable to switch the sign and became insignificant in other word it give a fake model. That is why in table 10 external aid is not statistical significant as their probability (0.7288) is greater than 5 and their coefficient became negative because is affected with that problem. The model we have in table 10 is fake. then to resolve this problem we remove one independent variable which is external aid because is affected with that problem as indicated in table 10 and we still depend on other because are correlated.

In table 11 shows that the parameters are as expected. According to these results, the C, LINV are statistically significant as their respective probabilities 0.0000, 0.0000 are less than critical value of 5% and The long run estimated model indicated that, investment and external aid are fitting the model because The Adjusted R-square 0.99 which is 99%, at 5% level of significance means that, the variables fit the model 99 %, and then the goodness of fit is better as indicated in table 10&11.even if we face the problem of multicolinearity, it doesn't affect the goodness of fit.

The table 13 showed that these variables have the same effect to justify GDP in short-run and investment is statistically significance at 5% level of significance and their level of fitness was 81% and the error collection term is also positive (RESIDLRt (0.0641859681521) because we resolve the problem of multicolinearity by remove one variable and still depend on other because are correlated. This is a good indicator that the correction of errors is possible. Basing on the value of the error correction term, the researcher conclude that around 50% of all errors will be corrected in 2.5 monthly14 days so around 100% of errors will be corrected in 5 monthly and 14days. Investment has positive effect on economic growth in short-run and long –run and also investment and external aid are higher correlated which means they have the same effect on economic growth. That is why the researcher concludes that the hypothesis of having the same effect of investment, external aid on economic growth was confirmed and accepted.

The confirmation of the first hypotheses was supported by the findings in the work of Munyakayanza J.D (2012), Twiringiyimana Eric (2013-2014), show that in Rwanda actually considers investment to be the main statistic on which to rely when calculating the GDP. The main relationship between GDP and investment is the fact that a rise in the level of investment translates to a corresponding rise in the of GDP, as showed by the results increase 1 unity of investment increase certain unity of GDP and the coefficient of correlation was positive it means that investment and GDP have the same tendency.

The confirmation of the second hypotheses was supported by the findings in the work of Twiringiyimana Eric (2013-2014), Patrick Joseph DUSHIME (2014-2015), by means of co-integration and error collection model, results found by using Eviews 4.1 proved that investment positive impact on economic growth in the long run and short-run in Rwanda. , as showed by the res, as showed by the results increase 1 unity of investment increase certain unity of GDP.

The researcher concluded that, investment, external aid and economic growth have the same tendency and then the investment has positive effect on economic growth of Rwanda in long-run and short-run. And also investment and external aid are highly correlated which means they have the same effect on economic growth. Finally all hypotheses were accepted.

5. CONCLUDING REMARKS

The general conclusion is composed by five main points such as: the problem statement, the summary of the main points, strengths and weaknesses of the study, recommendations and perspectives for further researchers.

THE SUMMARY OF THE MAIN POINTS

The aim of the study was to find out "effect of investment and external aid on economic growth in Rwanda". This study has conducted in limited period of time; the used data were for sixteen years means from 2000 up to 2015. By using annual time series data collected through documentary technique from BNR. The main results of this research were made from secondary data, the scientific methods and techniques which are scientifically known were used to analyze the data that is the reason why the results are reliable.

The objectives and the hypothesis cited in this study have been verified. In this study the first and the second hypotheses have been confirmed because, after analyzing the data the researcher found that, investment and external aid have tendency on economic growth in Rwanda as indicated in figure 4&5 and in table 5.

And from the results in tables 8, indicated that investment and external aids are highly correlated which means that they have the same effect on economic growth, also we face the problem of multicolinearity because those independent variables are higher correlated where VIF (**18.58193**) is greater than 5.that problem cause one independent variable to switch the sign and became insignificant in other word it give a fake model. That is why in table 10 external aid is not statistical significant as their probability (**0.7288**) is greater than 5 and their coefficient became negative because is affected with that problem. The model we have in table 10 is fake. then to resolve this problem we remove one independent variable which is external aid because is affected with that problem as indicated in table 10 and we still depend on investment because are correlated.

In table 11 shows that the parameters are as expected. According to these results, the C, LINV are statistically significant as their respective probabilities **0.0000**, **0.0000** are less than critical value of 5% and The long run estimated model indicated that, investment and external aid are fitting the model because The Adjusted R-square **0.99** which is **99%,** at 5% level of significance means that, the variables fit the model 99 %, and then the goodness of fit is better.

The table 13 showed that these variables have the same effect to justify GDP in short-run and investment is statistically significance at 5% level of significance and their level of fitness was 81% and the error collection term is also positive (**RESIDLR$_t$ (0.0641859681521**) because we resolve the problem of multicolinearity by remove one variable and still depend on other because are correlated. This is a good indicator that the correction of errors is possible. Basing on the value of the error correction term, the researcher conclude that around 50% of all errors will be corrected in 2.5 monthly14 days so around 100% of errors will be corrected in 5 monthly and 14days. Investment has positive effect on economic growth in short-run and long –run and also investment and external aid are higher correlated which means they have the same effect on economic growth.

Strengths of the study: availability of literature review and data, utilization of e-views7 program to analyze annual time series data which facilitated the task of detesting and cleaning the spurious problem like autocorrelation and heteroscedasticity and then after running or regressing econometric model by OLS method. Results found seem to be real in the developing country as Rwanda.

The general lesson that emerges from this study is that investment and external aid are highly correlated that is why they have a significant role on economic growth of Rwanda. Based on the findings in this study and further, to increase economic growth in Rwanda, the following recommendations are suggested to the government and police makers:

- The government of Rwanda should be encouraged investment by Promoting Private Sector One of the ways to achieve this policy objective is to create more wealth or to generate more employment

- Based on the high correlation between investment and external aid it would be better if government of Rwanda encourage the donors to change the form in which external aid comes which is in form of budget. Those external aids coming in form of budget are included in public investment that is why we face the problem of multicolinearty. Then donors might do this directly by supporting infrastructure, small farmers, building schools. That removes the problem of multicolinearity and external aid have significant on economic growth.

- The government of Rwanda should be encouraged investment by provision of necessary infrastructure, which will lower the cost of doing business in Rwanda.

- The government of Rwanda should be external investors to invest in business providing improving services provided to citizen.

REFERENCES

[1] Andrew beattie , (2015) different types of investment ,The New Palgrave. Article-preview links(from The New Palgrave: A Dictionary of Economics, 1987

[2] Asiimwe H. Mutamba, (2009), fundamental economics, East Africa Education, Kampala, Uganda

[3] asiimwe H.Mutamba (2006) dictionary of economics and commerce, MK publishers ltd, Kampala, Uganda

[4] Assiimwe Herbert (2009), dictionary of economics and commerce, MK publishers' ltd, Kampala, Uganda

[5] BARNIER, B. (1998), Macroeconomics, 5th edition, Dunod, Paris, France

[6] Bhalla (2001), security analysis and portfolio management

[7] BNR, Annual report 2010, p.23 Kigali

[8] BNR ,Annual report 2013/2014,p.25 Kigali

[9] BNR Annual Report 2014/ 2015 p.28 Kigali

[10] Burnside, C. and D. Dollar (2013), "Aid, policies, and growth," World Bank Policy Research Working Paper Series.N°.1777.

[11] Christensen (1991), Social sciences method, Dunod, Paris, France

[12] Clarck, (1992), impact of foreign aid in economic development of developing countries: Philippines

[13] Constantin NDATSIKIRA(.2013-2014), Macroeconomics course, ICK, unpublished document

[14] D.V.DWIDED, (2005), managerial economics, 6th edition, new Delh

[15] DFID Rwanda,(2012, p.2)Growth and Poverty Reduction Grant to the Government of Rwanda (2012/13-2014/15)

[16] Eatwell, John, et al., eds. (1990). Econometrics: The New Palgrave. Article-preview links (from The New Palgrave: A Dictionary of Economics, 1987

[17] Edmund Blair and Jenny Clover (2014), "Rwanda's foreign adventures test West's patience,"

[18] Eric perée (2007), International seminar on strengthening, public investment and managing fiscal risks form public and private partnerships, Mc Gram hill book company

[19] Farahnaz Mohammed (2013) An empirical analysis of the effect of aid on growth. International Advances in Economic Research. University of Nottingham, Nottingham.

[20] Fidèle DUSHIMIMANA (2014-2015), Reseach methodology course, ICK, Unpubliched document

[21] Hubbard &Anthony (2009), Macroeconomics. 2nd Edition: Pearson prentice Hall. New Jersey

[22] Jean R.(2008). National Bank of Rwanda. Economic Review $N^0$00 3.Kigali

[23] John Daintith , (2004), A Dictionary of Computing: Oxford University of Economics.

[24] Kelecki, M (1971) selected essays on dynamics of capitalist economy, London, Cambridge university press

[25] Kene,E .andCoulibaly, K .(2006). "Sources of Growth in Rwanda: Background paper to the Rwanda Country Economic Memorandum. World Bank :Washington, D.C.

[26] KeynesJ.M,(1979), the general theory of employment, interest rate and money, paris

[27] Kigabo,T. (2008). Leadership, policy making, quality of economic policies and their inclusiveness in Rwanda. 2nd edit Kigali –Rwanda

[28] Kregel,J.A.(1976) Economic methodology in face of uncertainty, the modeling methods of Keynes and post-Keynesians

[29] Kevin, (2008). Stress-testing financial investment systems: an overview of current mythologies. 3rd edition BIS Working Papers No.

[30] Lawn, P. (2007a), what value is Gross Domestic Product as a macroeconomic indicator of national income, well-being, and environmental stress? *International Journal of Ecological Economics and Statistics*,

[31] Lipsey, R. and Courant,P.N.(1996).economics: Harper Collins college publishers.New York.

[32] M.Parkin, (2010), economics, 9th Edition pearson education, USA

[33] Mankiw.N.G (2003), principle of macroeconomics, 3rd Edition, Canada

[34] Mankiw.N.G. (2003), principle of macroeconomics, 5th Edition, Canada

[35] Mathews R. (2012). GDP and the US Economy: 3 Ways to Measure Economic Production : Havard university press. New York

APPENDIX

Appendix1: *Data Used During Research from 2000-2015*

YEAR	GDP in Billions of LCU	Investment in billions	External aid in billions
2000	708.9	90.0	76.7
2001	741.9	102.0	64.2
2002	781.5	108.0	70.8
2003	955.2	138.0	76.2
2004	1137.9	181.0	128.7
2005	1439.9	227.0	164.5
2006	1716.5	286.0	169.1
2007	2044.6	391.0	207.3
2008	2576.6	634.0	383.4
2009	2985	713.0	347.4
2010	3279.8	771.0	397.4
2011	3828.3	905.0	443.1
2012	3935.7	1148.0	345.5
2013	4608	1291.0	459.2
2014	5082	1417.0	421.8
2015	5 837.0	1539.0	279.8