

Relationship of Foreign Direct Investment and Economics Growth on Rwandan Economic

Jeanne Baptiste Niyigena* and Wang Yongli

Abstract—The Rwandan economy has made a revolution compare to the past years and has attracted international investors through foreign direct investment and its economic policies. However, it is not clear whether these investment inflows have made a significant impact on economic growth. Many empirical studies have researched the impact or effect of foreign direct investment on economic growth in the host country; some researchers found a positive impact while others found a negative impact especially in a developing country as their said home country gains more benefit than host country depends in same domains. The objective of this paper is to analyze the relationship between Foreign direct investment (FDI) and economic growth by presenting the impact FDI has on Rwandan economic growth by employing the data from 1998 to 2018 a period of 20 years using World Bank data. This study presents two hypotheses related to GDP growth per capita and FDI. Multiple regression techniques and Augmented Dickey-Fuller Test were used to measure the relationships between independent (FDI) and dependent variables (real GDP). In addition, stationarity test was used and economic software Eviews 10 to present the result. The result showed that foreign direct investment has a positive but not statistically significant impact on Rwandan economic growth.

Index Terms—Economic growth, foreign direct investment, Rwanda, stationary test

I. INTRODUCTION

The word Foreign Direct Investment (FDI) is covered by two sets of related but different themes or activities, described by diverse theories and different sectors of the economy. The first can be called international finance or macroeconomics. The second can be called an industrial organization or microeconomics (Moran, 1999).

Foreign Direct Investment (FDI) has played an extraordinary role as a source of management, technology and external funds for developing countries, and economies in transition (Moran, 1999). In developed and developing countries, foreign direct investment by multinationals is still the main driving force for economic change. Foreign direct investment is generally employment generation, and development, technology overflow, improved export performance, currency appreciation, an expanded tax base and increased income and consumption (Musonera *et al.*, 2009).

In Africa and Eastern Africa, the growth rate of FDI inflows has increased in absolute terms between 1970 and 2013 has increased (Awolusi and Adeyeye, 2016). Africa's FDI share out of from 7.3% in 1970 to 33% in 2013, Eastern

Africa (EA) share out from 6.3% in 1970 to 25.5 % in 2013. EA has been attracting large number of foreign investors; its impact did not study well by applying dynamic growth methods. During the last decade, EA has been among the fastest growing regions in the world. It could achieve an average real GDP growth of 6.6% per annum (2000–2009) which approaches the millennium development target of 7 % per annum; how to sustain high growth rates and make growth more inclusive become the current challenge (African Development Bank Group, 2013). Despite remarkable improvements in access to social services (e.g., education and health), yet substantial variability is observed in the sub-region.

Foreign and domestic investment increased as foreign direct investment exceeded local investment and created new jobs. FDI partnerships with Rwandan companies should be encouraged and domestic investment is also seen as an integral part of this policy (Malunda and Musana, 2012).

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 counts 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 (Rwanda Energy Group, 2020).

The assumption of an econometric analysis of foreign direct investment and economic development is not clear, as some analyzes show the positive impact of foreign direct investment as a determinant of foreign direct investment, pointing to other important relationships. Since development depends on many factors, the effects of which are difficult to separate, and since FDI itself influences many of these factors, endless outcomes may be plausible, but there is no doubt that the rapid rise in FDI will certainly occur in many cases.

The overall goal of this research is to evaluate the relation of FDI and economic growth with the help of FDI impact on Rwandan economic growth throughout 1998–2018. 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. The significance of this study is to give the overview of the relationship between FDI and Rwandan economic growth. Therefore, far from reforms, and policy implemented recently, this study will critically

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contribute to the previews research and reveal the current aspect of FDI on Rwandan economy.

II. BACKGROUND OF RWANDA ECONOMIC GROWTH

Rwanda is a country located in East Africa with an estimated surface area of about 26,000 km² and a population of around 12 million people (Malunda and Musana, 2012). The country has the highest population density in Africa with about 550 people per square km (UNCTAD, 2006). The Rwandan economy is anchored on agriculture with 90% of the people relying on it for their livelihoods (Mwesiigye and Mulyungi, 2019). In 2000, the country’s budget deficit was 1.3% of the GDP while in 2010 it was 1.6% of the GDP. The country’s total budget in 2011 was 1,116.9 billion Rwandan francs (1.8 billion US\$) with agriculture receiving around 67.1 billion Rwf (0.106 billion US\$) (UNFCCC, 2020). In order to supplement locally generated revenues, the government has been relying on foreign direct investment and foreign aid (UNFCCC, 2020). In 2008, foreign direct investment accounted for 12% of the total amount of investment received in Rwanda (Rozendal, 2020). The extent to which foreign direct investment has impacted on Rwanda’s economic growth efforts is not clear. This study considers the period from 1998 to 2018. However, the country is also characterized by a poverty rate which is quite high (56.9% of total population) (Malunda and Musana, 2012).

According to the Central Bank of Rwanda’s report “Private Foreign Investment in Rwanda”, foreign private investment in Rwanda operations has been improved (Rwanda Development Board, 2019). In 2012, the inflow of foreign private capital to Rwanda was 356.6 million US dollars in 2011 and increased by 14.8% to 409.3 million US dollars 2012. Foreign direct investment dominates with 255 million US dollars, accounting for 62.3% of total inflows. Over the past ten years, the country has received \$ 238 billion in foreign investment. The Rwanda Development Board (RDB) registered foreign investment in 2017, an increase of \$ 515 million compared to 2016 (Mutua *et al.*, 2015).

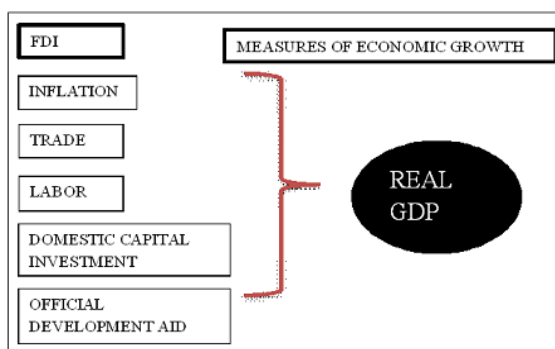


Fig. 1. Conceptual framework.

This section considers the relationship between economic growth per capita and key variables that include foreign direct investment, lobar force, trade (exports, imports), inflation, domestic capital investment, and official development aid because growth is multi-dimensional as shown in Fig. 1.

Exports are goods and services which are made in a given

country and sold to other countries as a way of generating foreign currency. Most studies have shown that exports have a positive impact on economic growth since the income generated provides a basis for importation of new innovations. Imports can also affect economic growth per capita in a positive way through enhancing access to new technological innovations and widening the range of consumer goods and services for consumers (Mullen and Williams, 2005).

In most of the studies, inflation has a negative impact on economic growth. Nevertheless, there are some levels of inflation which can be treated as tolerable to stimulate business activity through prices (Mello, 1999). Waldén *et al.* (1961) observed that households are affected negatively by inflation because of its impact on real incomes. Domestic capital especially at high levels tends to affect economic growth by increasing interest rates for the private sector and therefore dampening investment prospects (Samuel and Claude, 2014). When it’s come to labor, public spending on education impacts positively on economic growth as a result of the improvement in human capital. In general, the proposition that foreign aid can contribute to economic growth of the recipient country has strong economic theoretical foundation, but when the country receive huge amount of aid from donors it will have a negative effect on economic growth (Minoiu and Reddy, 2009).

III. METHODOLOGY

This study will evaluate the relationship of FDI and economic growth based on impact of FDI on the economic growth in Rwandan economic. Researchers will need to demonstrate all variables to see if the next phase of stationarity testing will use intersection or intersection and trend. Also, all variables (dependent and independent variables) will be tested for stationarity. The type of random process that has attracted widespread attention from time series analysts is called stationary random process.

When, variables were not stationary at their levels; that is, if the calculated results are less than the critical results or their probability is greater than 5% in the 95% confidence interval and 10% in the 90% confidence interval, these cases will cause the investigator to integrate the first or second difference.

A. Data and Model Specification

This research determines to evaluate the impact of FDI on the economic growth of Rwanda for 1998–2018 using the data from World Bank nationals’ account. The study analyzed time series data for twenty years. We have used E View 10 to facilitate the econometric analysis of the performance of foreign direct investment on economic growth in Rwanda. Several regressions analyze were used to measure the relationship between independent (FDI) and dependent (GDP growth) variables. Based on the theories of the neoclassical growth model, we developed a model to study the impact of foreign direct investment on economic growth in Rwanda. An econometric model derived from the neoclassical production function.

Trade, official development aid, and FDI are offered as additional input, based on the principles of domestic labor

and capital, as well as on the neoclassical development model. The inflation variable was also introduced as a substitute for the country’s macroeconomic stability. As we know, foreign direct investment is a major source for building human capital capacity and new technology for developing countries and this variable is included in the production function to capture external factors, display learning, and spillovers related to FDI.

$$y = \beta + \dots + \beta_n + \varepsilon \quad (1)$$

$$y_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 L_{it} + \beta_3 DK_{it} + \beta_4 TR_{it} + \beta_5 INFL_{it} + \beta_6 ODA_{it} + \varepsilon_{it} \quad (2)$$

Anywhere, Y_{it} is the annual real GDP growth, L_{it} the stock Labor force, DK_{it} is domestic capital investment, FDI_{it} is Foreign Direct Investment inflow, TR_{it} is the aggregate value of imports and export over the GDP for the same period with the relative importance of international trade in economy of country, ODA_{it} is the official Development Aid, $INFL_{it}$ is the inflation and ε_{it} stochastic disturbance. Thus $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficients of respective variables.

B. Test and Analysis of the Data

In this study, we used time-series data from 1998 to 2018, and most time series macroeconomic data are not static when the dependent and explanatory variables in the time series data are not constant or meaningless or the regression model is wrong as it used. It will probably happen. The R-squared may be higher, but combined with the lower Durbin Watson statistic; the resulting coefficient is statistically significant, although it is not. This case can confuse economic interpretation. However, to avoid false statistical inferences, we performed a static test of all the variables used in the model.

C. Stationarity Test

We used a stationary test to get time-series data to see if it is stationary or not. Most time series data is not stationary because it tends to have a linear or exponential trend (Almfraji and Almsafir, 2014). Stationarity testing is essential in modeling because macroeconomic data for different periods cannot be included in the same model. Static series or not influences the choice of model to be adopted when all series are not fixed, must be transformed to be stationary, and distinguished before modeling and estimation of parameters associated with the stability component.

The invariance justification is firmly based on the

traditional convergence theory of the least-squares method used for regression. This test is used to find out what methodology will be adopted when the series is stable, we use simple least squares (OLS), but did not use OLS when the series is not stable it can because of a no logical regression or false regression. Reflect Y_t and Y_{t-1} , Y_t is stationary when $E(\varepsilon)$ variance and auto variance of Y_{t-1} continue identically to those of Y_t . When a series is stationary, its mean, variance, and auto covariance of various lags are unbroken for any point where they are restrained, in other words, they do not vary over time (Chirwa and Odhiambo, 2016).

If the variable is not statistically significant minus zero, the presence of a unit root is evidence 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 ($H_1: Y_t \neq 0$) which shows the times series is stationary. Eliminating the null hypothesis would mean that Y_t is stationary.

IV. ANALYZE DATA AND INTERPRETATION RESULTS

The tables below demonstrate the result of the ADF test for unit root of our results. The probability values display that the variables are statistically significant for all lags. It points out that the time series is stationary respectively to the result presented above and there is a suggestion for rejecting the null hypothesis. We have used real GDP as dependent variable to measure the impact of FDI on Rwandan economic growth and as we know FDI affected by many factors depend on country, domestic capital investment, inflation, labor, official development aid and trade were independent variable

TABLE I: REALGDP ANALYZED BY ADF

Null Hypothesis: REALGDP has a unit root		
Exogenous: Constant, Linear Trend		
Lag Length: 1 (Automatic-based on SIC, maxlag=4)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.694637	0.0073
Test critical values	1% level	-4.532598
	5% level	-3.673616
	10% level	-3.277364

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

Table I show the null hypothesis of real GDP as is our dependent variable which determines the impact of FDI on Rwandan economic.

TABLE II. DATA RESULTS OF RWANDA ECONOMICS GROWTH

Dependent Variable: REALGDP				
Method: Least Squares				
Date: 12/07/20 Time: 16:31				
Sample: 1998–2018				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	8.810009	2.028308	-0.43597	0.6695
DK	0.07011	0.477672	0.146775	0.8854
INFLATION	0.008149	0.150714	0.054067	0.9576
LABOR	-7.528607	3.159006	-0.238531	0.8149
ODA	0.157615	0.412894	0.381732	0.7084
TRADE	0.164591	0.225663	0.729365	0.4778
C	4.027123	10.55687	0.38147	0.7086
R-squared	0.104366			

Table II displays the results of the regression equation. It shows the Official Development Aid has a positive and statistically significant effect on economic growth with a 95% confidence level. Trade and inflation have a positive effect on economic growth, but not high. Another growth driver we analyzed was the labor force, which had a negative but not statistically significant impact because most of the percentages of the labor are unskilled. Most of the (unskilled) labor is concentrated in the agricultural sector, which contributes 40% of the national GDP. However, the contribution is barely leisurely but they are known.

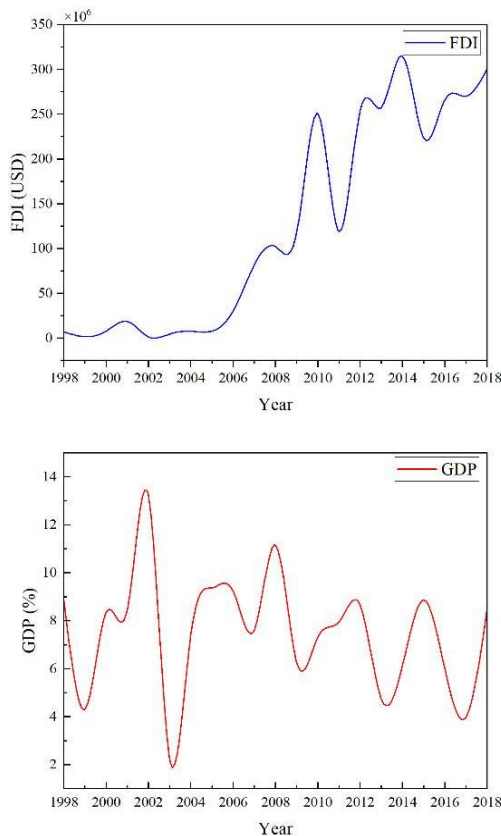


Fig. 2. Presentation of FDI and GDP of Rwanda from 1998–2018.

As it shows in Fig. 2, FDI of Rwanda has increased in the past and continue to increase, GDP has the up and down and this is not only cause of FDI because the increase of economic growth of a country depends on many factors.

Foreign direct investment has a positive but not statistically significant impact on Rwanda’s economic growth of 5%. The results also reveal the complementarity between FDI and the growth of foreign investment. Therefore, we reject H0 because statistics show that the 95% confidence level of FDI positively affects economic growth in Rwanda, but we accept H1.

When we go back to our equation;

$$\text{RealGDP} = 4.03 + 8.81fdi - 7.52l + 0.07dk + 0.16tr + 0.008inf l + 0.15oda + \epsilon_{it}$$

Std. Error	10.55	2.02	3.15	0.477	0.225	0.150	0.412
T. Statistic	0.381	-0.43	-0.23	0.146	0.729	0.054	0.381
Prob.	0.708	0.669	0.81	0.885	0.447	0.957	0.708

The results of the regression analysis suggest that foreign direct investment has a positive impact, but no significant effect on real GDP. This coefficient is shown by 8.810009.

The result shows that a 1% increase in FDI will result in an 8.10009 increase in real GDP. This means that FDI has a positive impact on Rwanda’s economy.

There is a positive but negligible impact on real GDP in the country’s capital. This is evidenced by the coefficient 0.07011. The result suggests that a 1% increase in domestic capital will result in a 0.7% increase in real GDP. This means that domestic capital has a positive but not significant impact on Rwanda’s economic growth.

Official Development Aid has a positive and statistically significant impact on real GDP; this is indicated by a coefficient of 0.157615. The result suggests that a 1% increase in ODA would be a 15% increase in real GDP. This means that the ODA has a positive and significant impact on Rwanda’s economic growth. R-square indicates that the dependent variable has a difference of 10.4% of the independent variable in our model.

We go to test our hypothesis;

H0: $\beta=0$, Foreign direct investment has no effect on Rwanda’s economic growth.

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

According to the results of the regression analysis, foreign direct investment has a positive effect on the gross domestic product (real GDP), which characterizes economic growth, so the null hypothesis is excluded. An alternative hypothesis is accepted that foreign direct investment has a positive effect on economic growth in Rwanda.

V. CONCLUSION

The main objective of this study was to evaluate the impact of foreign direct investment on Rwandan economic growth for a period of 1998 to 2018. Thus, the study concluded that foreign direct investment has a positive, but not statistically significant impact on Rwandan economic growth. This contradicts the belief of the same researchers that foreign direct investment negatively affects economic growth. The benefit of this study first is; this study will help future researchers to more understand the impact of FDI on Rwandan economic growth and search for other determinants for FDI attraction in Rwanda. The second it will give a clear picture of FDI attraction to the government of Rwanda as it continues to attract more investment in this country. The implication of this study is that as foreign investment will increase it will damage the domestic investment.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors conducted the research; Jeanne Baptiste Niyigena analyzed and wrote the paper; Wang Yongli financed the research. Both authors had approved the final version.

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