

## **FOREIGN CAPITAL INFLOWS AND ECONOMIC GROWTH IN RWANDA**

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### **ABSTRACT**

The assessment of the impact of foreign private capital has become a topic of interest to economists and policy makers given that it is essential for developing countries to bridge the savings gap for domestic economic development. Assessing the impact of foreign capital inflows on countries' development is of current interest by many economists in various countries.

In this paper, we empirically investigate the impact of foreign capital flows on economic growth in Rwanda. The empirical analysis builds on quarterly data spanning the period 2009Q1-2017Q4 and employs multivariate Johansen cointegration and parsimonious error correction model to estimate the specified relationship in the model.

The empirical results show that there exists long run relationship foreign direct investment, foreign aid, remittances, external borrowing and economic growth in Rwanda. The normalized coefficients indicate that foreign direct investment; remittances and foreign aid are positive and statistically significant implying that they positively influence economic growth. The parsimonious error correction model reveals that it takes close to eight quarters to adjust the deviations from the equilibrium path.

The policy implication arising out of these findings is that efforts to attract more capital flows especially foreign direct investment and remittances through improving investment climate and creating avenues for diaspora contributions should be strengthened.

**Keywords:** Economic growth, Foreign Capital Inflows, cointegration, error correction model

**JEL Classification Number:** F21,O40

### **1. INTRODUCTION**

The need for foreign capital flows to developing countries to supplement domestic savings for investment and economic growth cannot be overemphasized. Indeed, the quest for economic growth has been at the forefront of economic policy in developing countries. This, however, is

frequently hampered by the non-availability of resources that would drive the process of achieving the required economic growth.

Foreign capital inflows consist of the movements of financial resources from one country to another. In this regard, capital inflows broadly include various kinds of financial transactions such as; direct investment in productive capacity, investment in equities lending by governments, and international organizations; banks' lending, long and short term; investment in public or private bonds (Obadan, 2004).

According to (Aurangzeb and UI Haq, 2012), foreign capital inflows depends on a number of features of the host economy which include among others; institutional environment, market size, tax law, level of education, and overall macroeconomic and political environment and their on economic growth depend on the type of foreign capital and the type of economy (Aizenman, Jinjara & Park, 2013).

It is argued that foreign capital inflows are catalyst element to economic growth in economies that lack long term financing due to low domestic savings. To overcome this challenge, efforts to attract foreign resources are emphasized (Allen. O, 2012).

Foreign capital inflows stimulate the process of economic development and lead towards a healthy economy. Inflows enhance the capacity of production and reduce unemployment with effective allocation of resources. The role of capital inflows is eminent in developing countries because they are deficient in capital, skilled labour and modern technology. The rising trend of capital inflows has been studied by earlier researchers who found mixed results

According to Sharafat (2014), to meet their economic growth goals, most resources-deficient countries rely on foreign capital inflows. The experience of the newly industrialized economies of south Asia has formed the belief that foreign capital inflows could fill the resource gap-deficient economies. Even though most of the literature show the positive effects of foreign capital inflows on economic growth, other findings reveal negative impact of these flows.

Recent studies have attributed these conflicting findings to factors such as the utilization of these capital inflows and deficiency in data. For a particular country, therefore, actual effects can be determined empirically.

In aftermath of 1994 genocide, Rwanda has undertaken various reforms to revamp her economy and one of the key reforms was to put in place pro- investment reforms to accelerate the country's economic growth. Indeed, Rwanda like most developing economies has benefited enormously from capital flows, recording stock of USD 2.2 billion at the end of 2016 in form of foreign direct investment (FDI), portfolio investment (PI) and external private debits.

In view of the preceding, there is a big chunk of literature on the impact of foreign capital flows on economic growth in different countries, however; no similar study has been conducted for the case of Rwanda. Secondly, most studies have focused on each type of capital flow and a few that examined a group of capital flows together have done this for developing countries generally. This underpins the need to undertake this study.

The main objective of this study is to investigate the impact of foreign inflows on economic growth in Rwanda using econometric model covering the period 2009Q1 to 2017Q4. On the basis of the study findings, the paper suggests policy recommendations to the policy makers to improve the existing capital inflows management framework.

The rest of this paper is structured as follows: Section 1 entails the introduction, motivation of the study and objectives of the study. Section 2 includes an overview of Rwandan economy as relates to capital flows and growth, section 3 includes both theoretical and empirical literature as relates to the study, section 4 describes the methodology, and section 5 reports empirical results and section 6 presents discussion of results, conclusion and recommendations.

## **2. FOREIGN CAPITAL INFLOWS TRENDS IN RWANDA**

In 1998, The Rwanda Investment and Promotion Agency (RIPA) was created to promote investment and in 2004, its mandate was expanded to include export promotion and changed name to Rwanda Investment and Export Promotion Agency (RIEPA) until 2009 when the country decided to create Rwanda Development Board, as one stop Centre, with one of its core mandate being accelerating the country's economic growth through attraction and facilitation of foreign private investments to supplement the domestic resources.

Since then, Rwanda has been very active in improving investment environment by enacting laws and making radical reforms to make a conducive investment climate for both foreign and domestic investors. According to the World Bank Doing Business Report (2018), Rwanda has been among the best reformers of business regulation and doing business worldwide for almost two decades. More than 52 reforms have been implemented and the world ranking has improved from 148 place in 2008 to 41 place in 2016, in the last 15 years, is ranked the first country in Sub-Saharan Africa to make more reforms.

The process to start a business and get all the required papers has been made easier where it currently takes only 6 hours to get all the required documents to start a business. The Government through the Rwanda Development Board (RDB), is working tirelessly to improve the doing business in Rwanda, attracts more investments and expects local and foreign investments to grow by 25 to 30 percent of GDP by 2020.

Currently, a whole package for investment promotion can be found within Rwanda Development Board (RDB). The package includes among others: regulatory framework, registration facilities and requirements, change of registered business, closing business, disclosure requirements, and other facilities such as work permit, government's protection of investments, settlement of disputes, transfer of funds and etc. Both foreign public and private resources are mobilized to support the country's development agenda as supplement to domestic resources.

In addition, Foreign Private Investments much effort has been put in creating many avenues for the diaspora to contribute to their home country. The Government of Rwanda strongly believes that the Rwandan migrants are important constituents that can contribute to the socio-economic development of their homeland. The contribution of Rwandan migrants to the development of their home country is envisaged through capital and remittance transfers, community development through different initiatives including recent Agaciro Development Fund, Diaspora bonds and mutual funds to mention but a few.

Moreover, the country commits to finance the country's economic agenda to reach the lower middle-income status by 2020, other sources of foreign finances are also tapped. These entail loans or grants from multilaterals, governments, banks and firms. Foreign aid as well as external borrowing are also playing a vital role to supplement other sources of foreign financing.

In nutshell, the foreign capital inflows have played an important role in the economic growth process. They have been financing the capital formation and the balance of payments. As can be viewed in the table 1, FDI, remittances, foreign aid and external loans contribution to the GDP have been increasing on average by 14.5 percent altogether considering the period 2009 to 2017. Besides, these foreign capital inflows have been an important channel through which the country acquires technology, know-how, employment generation and hence contribute to economic growth.

**Table 1: Foreign capital inflows as percentage of real GDP**

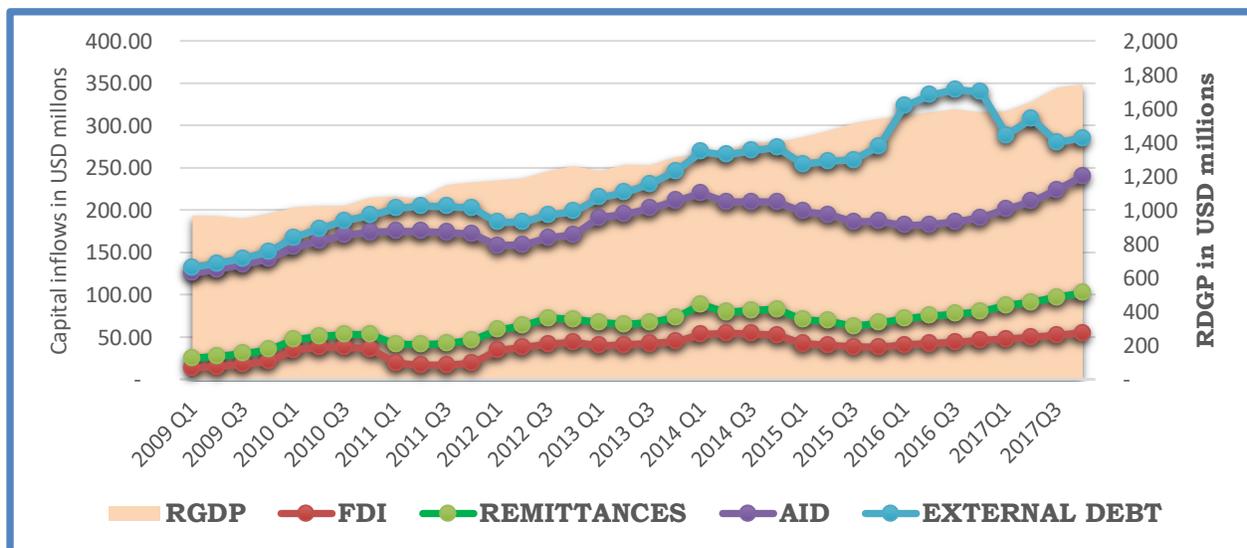
YEAR	FDI	Remittances	Aid	External debt
2009	1.75	1.30	10.79	0.76
2010	3.53	1.38	11.13	1.52
2011	1.60	2.24	11.73	2.67
2012	2.40	1.65	5.98	1.67
2013	3.30	2.07	10.46	2.23
2014	3.00	2.18	9.46	4.20
2015	2.70	1.85	8.36	4.71
2016	3.32	2.09	6.94	9.51
2017	3.63	2.57	7.41	4.27

Source: BNR, Statistics Department, 2017

The National Bank of Rwanda (NBR) Foreign Capital Investment Report (2017) shows that Foreign Private Investments including Foreign Direct Investments (FDI), Portfolio Investment (PFI) and Private Debts have been increasing for the last ten years to the level of \$ 2.2 billion as at the end of 2016.

According to the the balance of payments statistics at the National bank of Rwanda all the foreign inflows have been increasing over time. The figure below depicts the evolution of capital flows from 2009-2017.

**Figure 1: Real DGP and foreign capital inflows (USD millions)**



Source: BNR, Statistics Department, 2017

We observe a consistent growth of external loans from around USD 150 million in the first quarter 2009 to 250 million in 2017. The growth has been smooth up to 2013, where from we see an upward change in growth as the country issued its first Eurobond and 2016 as the country was borrowing for two big projects it was undertaking.

With regards to FDI and remittances, we see a steady grow from low levels of less than USD 30 million in the first quarter of 2009 to around USD 70 million in the last quarter of 2017.

Foreign aid has been somewhat stable throughout the period despite some variations in 2012 due aid cut and 2014 on ward due to shift from aid to external borrowing.

### **3. LITERATURE REVIEW**

#### **3.1 Theoretical Literature**

The theoretical basis of this paper is to explore the possibility of foreign capital inflows as drivers of economic growth in Rwanda. It is based on the long run models of economic growth including Harrod and Domar, Neo-classical and endogenous growth model. Due to the drawbacks of both Harrod-Domar and the neoclassical growth models, Romer (1986) and Lucas (1988) propounded the endogenous growth model which documents the importance of endogeneity of capital in the growth process. Assumption of increasing returns as opposed to constant returns of capital typical in the neoclassical growth theory was another differencing attribute.

This theory also emphasized the importance of human capital in the growth process, and hence the assessment of foreign capital flows on economic growth fits into this new growth theory since capital flows come with spillover effects such as technology and knowledge.

Lucas, for instance, assumes that investment in education leads to production of human capital which is the crucial determinant of the growth process. Issues of research and development and learning by doing or by investment became important in the new growth theory.

Due to shortage of domestic savings, capital inflows in developing countries are regarded as an engine of economic growth (Sharafat, 2014). The theoretical framework in which the role of foreign capital inflows can be seen is the two gap model which shows the savings and foreign exchange gaps.

Ajayi and Oke (2012:) used the dual-gap theory or two-gap approach developed by Chenery and Strout (1966) to explain how foreign debt leads to economic growth. The dual gap analysis shows that development is a function of investment and that such investment, which requires domestic savings, is not sufficient to ensure that development takes place. Foreign capital

features where there is a savings-investment gap and where an import-export exchange gap exists.

According to De Mello (1999), Positive effects of FDI on economic growth can occur directly by increasing the stock of physical capital in the recipient country as foreign capital is accumulated indirectly by encouraging human capital development and strongly boosting technological upgrading.

According to Borensztein et al. (1998) and Alfaro et al. (2008) found a positive impact of FDI on economic growth. For instance, Borensztein et al. (1998) found that the positive impact of FDI on growth was dependent on the stock of available human capital. In countries with low levels of human capital, the impact of FDI on growth was negative.

A big chunk of researches on the aid –growth nexus was conducted and the results revealed mixed relationships. Rosenstein-Rodan (1961), Chenery and Strout (1966), Mosley et al. (1987), Murthy et al. (1994), Giles (1994), Karras (2006) among others, found out that foreign aid positively affects economic growth. Other studies (Papanek, 1973, Newlyn, 1973; Knack, 2000; Gong and Heng-fu, 2001; Boakye, 2008; Mallik, 2008) have found a negative relationship between foreign aid and growth.

Few studies have been done on the remittances-growth nexus. However, the conclusions have been mixed. Barajas et al. (2009) and Siddique et al. (2010) for example found that remittances have no impact on economic growth.

Siddique et al. (2010) found no causal relationship between economic growth and remittances in India, but found a two-way relationship between remittances and economic growth in Sri Lanka, and that remittances did not lead to economic growth in Bangladesh.

Studies on capital inflows into India and its impact on economic growth have been carried out by Rangarajan (2001), Sethi and Patnaik (2007). The study by Rangarajan (2001) investigates the capital flows into India and its impact on the capital formation and economic growth considering five explanatory variables, namely net official flows, net private capital flows, net direct investment, net portfolio investment and other net investment for 1992 to 2000 period. He debates that capital flows can be promoted purely by external factors, which might tend to be less sustainable than those originated from domestic dynamics. He further states that both capital inflows and outflows, when they are large and sudden, have implication for economies. He concludes that capital account liberalization is not a discrete event.

On foreign borrowing/other investment, a few studies (Waheed, 2004; Macias and Massa, 2009; Driffield and Jones, 2013; Ocharo et al., 2014; Sethi and Patnaik, 2015; among others) have examined the relationship between foreign borrowing flows and economic growth. Macias and

Massa (2009) examination of the long-run relationship on a number of Sub-Saharan African countries revealed the positive impact of FDI and cross-border bank lending on economic growth in Sub-Saharan Africa.

A breadth of literature exists on combined effect of capital inflows and economic growth (Papanek, 1973; Rangarajan (2001); Narayan, 2007; Sethi and Patnaik 2007; Furo, 2012; Sethi, 2013) and has yielded mixed results but many showing positive impact of foreign capital inflows and growth.

In his study, Papanek (1973) divided foreign capital inflows into 3 major components: Foreign private investment, foreign aid and all other foreign. He studied 34 countries in 1950 and 51 countries in 1960 a cross sectional data and found out that all the three flows had a statistically significant positive impact on growth. Amongst all the components, foreign aid displayed robust effect on economic growth than other factors.

### **3.2 Empirical Literature**

Empirical studies on the impact of foreign capital flows on economic growth are based on different theoretical frameworks, empirical models and samples which often produce divergent results. In this regard, the following subsection reviews relevant empirical studies on the impact of foreign capital flows on economic growth. Indeed, a sizeable chunk of literature focusing on the capital flows –growth nexus is mixed at best.

Ocharo and Ojiambo (2015) in their study foreign capital inflows and economic growth in Kenya using Granger Causality and Autoregressive Distributed Lag procedures found that the coefficient of the log of the ratio of remittances to GDP to be significant at 1 per cent level. A 10 per cent rise in the ratio of remittances to GDP will lead to an increase of economic growth by 1.5 per cent.

Adrino Mazenda (2014) in his study the effect of Foreign Direct Investment on Economic Growth in South Africa using Johansen cointegration and Vector Error Correction Modelling (VECM) framework found that foreign direct investment and external debt have negative and statistically significant relationship with economic growth

Narayan (2013) examined the casual relationship between foreign capital inflows and economic growth in India. Using the pair-wise Granger causality test (1969), he specifically examines causal relationship between foreign capital inflows and economic growth in India. The important observations emerge from pair-wise Granger causality test, which shows there is the long-run equilibrium relationships exist between the following pairs of variables viz., economic growth and Foreign Direct Investment (FDI), economic growth and Foreign Portfolio Investment (FPI).

Aizenman et al. (2013) in their study of 105 countries from 1990 to 2010 using panel data estimation found that there is a link between growth and lagged capital flows depends on the type of flows, economic structure, and global growth patterns and growth but a smaller and less stable relationship between growth and equity flows. On the other hand, the relationship between growth and short-term debt was found to be nil before the 2008 financial crisis, and negative during the crisis period.

Philip Micheal Kargbo (2012) examine the impact of foreign aid on economic growth in Sierra Leone using a triangulation of approaches involving autoregressive distributed lag bounds test and the Johansen maximum likelihood approach to cointegration for the period 1970-2007 and finds that foreign aid has a significant contribution in promoting economic growth in sierra leone.

Adenayi et al. (2012) studied the link between FDI and economic growth, using Granger causality and Vector Error Correction Model (VECM) for Ivory Coast, Gambia, Ghana, Nigeria and Sierra Leone. They found co causal relationship in Nigeria and there was neither short nor long-term influence of FDI on growth in Sierra Leone. The study however revealed the role of sound financial institutions as intermediaries to the relationship between FDI and growth. For the foregoing, it is clear that there is no conclusive evidence on the impact of FDI on economic growth. This finding is also confirmed by Ray (2012) and Ojiambo and Ocharo (2016).

Using cointegration, variance decomposition and impulse response analysis and block exogeneity tests Emeka and Furo (2012) studied the casual relationship between foreign capital inflows and economic growth and as well the impact of foreign capital inflows on economic growth in Nigeria from 1991 to 2010. A causality analysis was performed on the foreign capital inflows namely FDI, AID, Remittance and External debt and economic growth. The results revealed the existence of a causal relationship between foreign capital inflows and economic growth in Nigeria

Odhiambo, (2011) studied the dynamic causal relationship between financial deepening and economic growth in Tanzania using a multivariate Johnsen cointegration model. The study included foreign capital inflows as an intermittent variable between financial deepening and economic growth, thereby creating a simple tri-variate model. Using the newly introduced ARDL-bounds testing procedure, the study finds a distinct unidirectional casual flow from economic growth to financial depth in Tanzania. This applies irrespective of whether the causality is estimated in the short run or in the long-run. Other results show that there is a bi-directional causality between financial development and foreign capital inflows, and a prima-facie unidirectional causality from foreign capital inflows to economic growth. The study,

therefore, concludes that financial development in Tanzania follows growth, irrespective of whether the causality is estimated in a static or dynamic formulation.

Pradhan (2011) explored on the role of FDI on the trade- led growth hypothesis in three countries, namely Australia, Canada and Israel for the period 1965-2009. The study was based on panel cointegration and causality tests. The results show long-run cointegration relationship of FDI and growth after allowing for heterogeneous country effect. The causality test confirms the presence of long run and short-run bi-directional causality between openness and economic growth. It also confirms the presence of unidirectional causality from economic growth to FDI, but not vice versa. At individual level, FDI was found to cause economic growth on Australian economy only.

Narayan (2007) also investigated the impact of international capital flows on India's financial markets and economic growth, using data from 1995 to 2005 and found that FDI has positive effects on economic growth, while Foreign Institutional Investment negatively affects the India's economic growth.

Levine, (2002) using both OLS and GMM estimation techniques on a panel of 72 countries, showed that the growth effects of FDI are inconsistent with the assumption of a positive impact.

Bailliu (2000) in his study of 40 developing countries from 1975 – 1995 using panel generalised method of moments (GMM) estimation techniques observed that capital inflows promote higher economic growth for countries which have attained a particular development level in the banking sector, above and beyond any effects on the investment rate. Bailliu therefore concluded that domestic financial sector is an essential tool in the advancement of economic growth by international capital flows in developing countries

### **3.2.1 The appraisal of literature**

Considerable amount of theoretical and empirical literature reviewed on the subject have yielded mixed results at best. From the theoretical viewpoint, the capital flow growth nexus is based on the long run models of economic growth particularly the endogenous growth model that documents the importance of endogeneity of capital in the growth process.

From the empirical literature, we observe that various empirical studies have focused on the impact of foreign direct investment (FDI) on economic growth, for instance, foreign direct investment has been argued to have more positive effect on the economic growth of developing countries due to capital accumulation and technology transfer.

It was observed that generally foreign capital flows might lead to economic growth. While some capital flows have been observed to impact more positively on growth, others such external private debt may have negative effects.

From the methodological perspective, though literature is not unanimous to which econometric model is the best to estimate such relationship, the most recent country specific studies have followed multivariate Johansen cointegration and error correction modelling as the estimation methods.

**4. METHODOLOGY**

**4.1 Theoretical Model**

The theoretical framework that underpins our methodology is based on the endogenous growth model, which is fundamental in explaining the importance of capital flows in economic growth. It builds on the two factor neo-classical model propounded by Solow (1956) and extended to incorporate the role of technological change.

The endogenous growth model takes the form of a cobb-douglas function specified as-

$y_t = A^\lambda K_t^\alpha l_{it}^\beta \dots\dots (1)$  Where Y IS Total output, L = Labour input, K=Capital input and A= Total factor productivity

$\alpha$  and  $\beta$  are output elasticities for labour and capital respectively. Output elasticity measures the responsiveness of output to a change in levels of either labour or capital used in production and  $\lambda$  allows for factors changing the efficiency of the production process. In the context of this study, our focus is the output responsiveness to changes in capital.

From the theoretical foundations of profit-maximization, a perfectly competitive firm or industry will employ labor and capital such that the marginal revenue product of labor (MRPL) equals the wage (w) and the marginal revenue product of capital (MRPK) equals the rental price of capital (R). Marginal products of labor and capital are derived by differentiating equation (1) with respect to labor and capital respectively. These are then multiplied by unit price (p) to obtain MRPL and MRPK as below.

$MRP_L = P\beta A^\lambda K^\alpha L^{\beta-1} = W \dots\dots\dots (2)$

$MRP_K = P\alpha A^\lambda K^{\alpha-1} L^\beta = R \dots\dots\dots (3)$

Solving this system simultaneously for L allows us to eliminate labour from the expression for output in equation (1). This results in the equation below.

$$y_t = A^\lambda \left( \frac{\alpha k_t}{\alpha} \left| \frac{R}{w} \right. \right) \alpha K_t^\alpha \dots\dots\dots (4)$$

Taking natural logarithms, we obtain

$$\ln y_{it} = \alpha_0 + \alpha_1 \ln A + \alpha_2 \ln k_t \dots\dots\dots (5)$$

A is assumed to change with capital, this gives the basic estimation equation as specified below-

$$\ln y_t = \alpha_0 + \alpha_1 \ln fdi_t + \alpha_2 \ln rem + \alpha_3 \ln aid + \ln exd_t + \varepsilon_t \dots\dots\dots (6)$$

**4.2 Empirical Model**

To estimate the capital flows growth nexus we follow multivariate Johansen cointegration and the associated error correction estimation procedures. The analysis builds on a country level macro- data spanning the period from 2009Q1-2017Q4.

The method employed in the study is based on recent advancement on recent theoretical and empirical capital flows –growth nexus. The estimations begin with assessing the stochastic properties of data (unit roots test) followed by cointegration analysis using Johansen approach and parsimonious error correction model. The model is therefore specified as follows:

$\ln RGDP = \beta_0 + \beta_1 \ln FDI_t + \beta_2 \ln REM_t + \beta_3 \ln AID_t + \beta_4 \ln EXD_t + \mu_t \dots\dots\dots 7$  where  $\ln RGDP$  is natural logarithm of real growth domestic product,  $\ln FDI$  is natural logarithm of foreign direct investment,  $\ln RMT$  is natural logarithms of remittances,  $\ln AID_t$  is the natural logarithm of foreign Aid,  $\ln EXD$  is the natural logarithm of other investment and  $\mu_t$  is the stochastic term.

**4.2.1 Data sources and construction of variables**

The data required to conduct empirical analysis is essentially secondary data and is sourced from National Bank of Rwanda (BNR), Ministry of Finance and Economic planning (MINECOFIN) and National Institute of Statistics of Rwanda. The variables to be used gross domestic product, foreign direct investment, remittances, foreign aid and external debt.

Real Gross domestic product growth rate (GDP) is used for the level of domestic economic growth, foreign direct investment inflows include equity, reinvested earnings and debts from affiliates, remittances is used for the inbound remittances, foreign aid entails budgetary grants, non- budgetary grants and project grants to Rwanda and external debt including external public and private borrowing. All variables were transformed into natural logarithms.

## **5. EMPIRICAL RESULTS**

### **5.1 Descriptive Statistics and correlation results**

The descriptive statistics are used to visualize the behavior of data, to allow simpler and meaningful interpretation. The descriptive statistics results of the variables involved in the study are presented in appendix table1. Looking at the mean and the standard deviation, we see that there was no case where the standard deviation was greater than the mean. This suggested that the mean was a good estimator of the parameters. Most of the variables in the study are symmetric as evidenced by the median which is very close to the mean except for LNRGDP and LNFDI. The Kurtosis is less than 3 except for LNGDP, indicating a flatter distribution than the Gaussian distribution. The Jarque – Bera test rejects the null hypothesis as all its values are higher than 2, except for LNEXTD. All the correlation coefficients in the correlation matrix lie between 0 and 1 which show a positive relationship between the variables. When the correlation coefficient is positive the two variables tend to move in the same direction and negative when two variables tend to move in the opposite directions.

### **5.2 Unit root tests**

As necessary but not sufficient condition, prior to estimating the long-run model explaining the impact of capital flows on economic growth in Rwanda, it is essential to investigate whether data series are stationary at level or in differences. The importance of tests for stationarity of variables is rooted in the fact that regression involving non-stationary variables leads to spurious regressions since the estimated coefficients would be biased and inconsistent. When all or some of the variables are not stationary, it is important therefore to carry out appropriate transformation (differencing) to make them stationary. Both conventional Dickey Fuller and Philip-Perron unit root tests for stationarity were used to test for stationarity.

**Table 2a: Augmented Dickey-Fuller unit root test results**

	Level		First Difference		Conclusions
	Intercept	Trend and intercept	Intercept	Trend and intercept	
LNRGDP	-1.724	-1.345	-2.083	-4.153*	I(1)
LNFDI	-2.972**	-2.243	-3.037**	-4.659*	I(1)
LNREM	-2.014	-2.808	-6.587*		I(1)
LNAID	-2.342	-2.986	-3.562**	-4.235*	I(1)
LNEXD	-0.736	-3.398**	-5.493*		I(0)

**Source:** Authors' estimation

Note: \* and \*\* indicate statistical significance at the 1% and, 5% levels of significance, respectively.

**Table 1b: Phillips-Perron unit root test results**

	Level		First Difference		Conclusions
	Intercept	Trend and intercept	Intercept	Trend and intercept	
LNRGDP	-2.095	-2.067	-3.849*		I(1)
LNFDI	-2.284	-2.804	-3.935*		I(1)
LNREM	-2.062	-2.808	-6.611*		I(1)
LNAID	-1.729	-2.355	-3.616*		I(1)
LNEXD	-1.266	-3.302*			I(0)

**Source:** Authors' estimation

Note: \* and \*\* indicate statistical significance at the 1% and, 5% levels of significance, respectively.

ADF tests in table 2 panel A reveal that all variables except lnEXD which is I (0) are integrated of order one I (1) with ADF statistic greater than critical values at 1 and 5 percent. This means that except lnEXD, the rest of the variables are difference stationary.

In addition, we tested the validity of the ADF conclusions using the PP test for unit root and the table 2 panel B shows that the PP test results are a confirmation of the DF results, we can therefore conclude that all the variables except one which is I (0) are integrated of order one.

**5.3 Cointegration analysis**

After the testing of unit root properties of the variables using ADF and PP tests, we proceed to establish whether there is a long run relationship among the variables using Johansen cointegration full information maximum likelihood method (Johansen and Julius, 1990).

**Table 2: Johansen Cointegration test results**

<b>i. Trace Test</b>				
Hypothesized No. of CE(s)	Eigen-value	Trace Statistic	Critical Value (0.05)	Prob.**
None *	0.5359	78.4534	60.0614	0.0007
At most 1 *	0.4662	50.8159	40.1749	0.0031
At most 2 *	0.3632	28.2180	24.2760	0.0151
At most 3	0.2766	11.9733	12.3209	0.0571
At most 4	0.0087	0.3154	4.1299	0.6364
<b>II. Maximum Eigenvalue</b>				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Critical Value (0.05)	Prob.**
None	0.535924	27.63749	30.43961	0.1075
At most 1	0.466192	22.59789	24.15921	0.0802
At most 2	0.363163	16.24467	17.7973	0.0843
At most 3 *	0.276628	11.65796	11.2248	0.0419
At most 4	0.008722	0.315371	4.129906	0.6364
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level				
Max-eigenvalue test indicates one cointegrating Equation at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

**Source:** Authors' estimation

From the table 3 above, the results obtained show that trace statistic indicates three cointegrating equations while max-Eigen value indicates on cointegrating equation given that both statistics are greater than their critical values at 5 percent and their associated p-values are significant Thus, the null hypothesis of no cointegration is rejected. The presence of cointegration in the relationship among variables mimics the existence of long-run relationship between real GDP and its explanatory variables. Hence, the cointegrating equation captures the steady state relationship between the real GDP and its regressors.

**5.4 Long run Model**

After confirming the existence of cointegration between economic growth and foreign capital flows we are at liberty to conduct long run estimates. In this study, the first cointegrating vector, therefore, is utilized as the long-run relationship. The central idea here is that the steady state growth model involves normalizing the cointegration vector on Lnrgdp as per Johansen maximum likelihood method in order to obtain the impact of different explanatory variables used in this model on the long run real growth.

The table below presents the long-run estimates of the capital flows -growth relationship for Rwanda using the Johansen maximum likelihood approach.

**Table 4: Normalized coefficients**

Normalized coefficients( T-values in parentheses)				
LNRGDP	lnREM	lnFDI	lnAID	lnEXD
1.000000	-1.02	-0.39	-0.92	0.51
	(3.93)	(9.26)	(2.07)	(3.58)

**Source :** Authors’ estimation

In equation form, the normalized coefficients can be expressed as-

$$\text{LnGDP} = 1.02 \text{ lnREM} + 0.92 \text{ lnAID} + 0.39\text{lnFDI} - 0.51\text{lnEXD}.....(8)$$

**3.93**
**9.26**
**2.07**
**3.58**

In the long-run relationship depicted in the above equation, the results of normalized coefficients show a positive and statistically significant relationship between economic growth and remittances and FDI and AID during the period under study. Whilst the relationship between economic growth and external loans (EXD) is shown to be negative and statistically significant.

The elasticity of growth with respect to aid is 1.02, this result confirms that official development assistance has continued to play a crucial role in supporting national efforts on economic development and poverty reduction with majority of official development assistance now disbursed through the government of Rwanda’ budget. Though Rwanda strives to be self-reliant in the long-run, aid is still needed to bridge the savings –investment gap to spur economic growth. The study findings are in line with other studies such as Karras (2006), Kargbo (2012) and Ojiambo (2015).

Foreign direct investment coefficient indicate that lnfdi is positive and significant, the elasticity of growth to FDI is 0.39 implying higher foreign direct investment inflows have highly contributed to economic growth through service sector development particularly financial and telecommunications sectors where FDI inflows have grown more than in other sectors.

The inbound remittances coefficient is positive and significant with the elasticity of growth to remittances of 0.92 reflecting the contribution of Rwandan migrants to the development of their home country is through different initiatives including cash transfers to family members, Diaspora bonds and mutual funds. This finding is line with Rubyutsa (2012) in his study the impact of remittances on economic growth in Rwanda.

Finally, the coefficient for other investment turns out to be negative and significant implying that external debt has a negative impact on growth. This is due to the fact that increase in externa debt leads to the increase in debt servicing which in return reduces the financial resources available for economic development projects in the economy.

### **5.5 Parsimonious Error Correction Model**

We utilized the error correction mechanism to capture the short run dynamics of the model formulated based on the identified long run relationships. The ECM has cointegration relation built into the specification so that it restricts the long run behavior of the endogenous variable to converge to their cointegrating relationships while allowing for short run adjustment dynamics. The cointegrating term is known as the error correction term since the deviation from long run equilibrium is corrected gradually through a series of partial short run adjustments. Thus cointegration implies the presence of error correcting representation and any deviation from equilibrium will revert back to its long run path. The table shows the ECM results.

**Table 3: The Error-Correction Model results**

Method: Least Squares				
Date: 07/16/18 Time: 11:55				
Sample: 2009Q1 2017Q4				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFDI)	0.01899	0.041085	0.46221	0.6473
D(LNAID)	-0.777178	0.111199	-6.989041	0
LNEXD	-0.020262	0.008422	-2.405858	0.0225

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D(LNREM)	0.002112	0.048692	0.043384	0.9657
UT(-1)	-0.138061	0.054678	-2.524995	0.0271
C	0.085586	0.035296	2.424793	0.0215

**Source:** Authors' estimation

The short run adjustments are generally insignificant except for other investment which is significant at the 5% level. In this case other investment carries the burden of short run adjustment in the dynamic growth- capital flows nexus model.

The vector error correction term (-0.138) is negative and significant which indicates that 13.8 percent of the disequilibrium in the previous period is corrected in one quarter. Thus it takes about eight quarters for the deviation to adjust to the long run steady state position.

## **6. CONCLUSION AND POLICY RECOMMENDATIONS**

Foreign flows remain the important source of finance for capital poor countries and continues to play a key role in financing development needs. Indeed Rwanda has over the period received substantial inflows in terms of FDI, AID, remittances and external debts. These capital inflows have helped in sustaining the balance of payments. Although a number of studies have been conducted to examine the effect of each of the forms of foreign capital inflows on economic growth in different countries, none was conducted in Rwanda. The results from different studies have been mixed.

The main objective of this study is to examine the capital flows -Growth nexus in Rwanda using quarterly data spanning the period 2009Q1-2017Q4.

We employed a multivariate cointegration technique based on maximum likelihood method to estimate long run aid- growth estimates whereas ECM was used to assess the short-run to assess the short-run relationships and the linkage with the long-run equilibrium path.

The major finding points to a positive and statistically significant relationship between economic growth and Remittances and FDI and AID. However, the relationship between economic growth and external loans is found to be negative and statistically significant due to the fact that external borrowing is associated with high cost of borrowed money in the terms of debt servicing thereby negating economic growth.

### **6.1 Policy recommendations**

The findings from this study have some policy implications that will reinforce the observed benefits derived from capital flows- growth nexus.

The government should encourage domestic savings through financial education, this will increase savings that is adequate to finance investment and close savings –investment gap in the long run and this will help Rwandan economy move towards self-reliance.

Government should reinforce the existing favourable investment policies such ease of doing business and well defined property rights that promote the inflows of international capital and foreign investment, so as to enhance Rwanda’s production capacity.

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**ANNEXES**

**Table 1. Descriptive statistics**

<b>Statistic</b>	<b>LNGDP</b>	<b>LNFDI</b>	<b>LNAID</b>	<b>LNEXD</b>	<b>LNREM</b>
<b>Mean</b>	7.594205	4.010546	5.177493	4.002769	3.211577
<b>Median</b>	7.600548	4.144860	5.207426	3.945999	3.299145
<b>Maximum</b>	7.903118	4.386789	5.406324	5.285128	3.847526
<b>Minimum</b>	7.423394	3.120280	4.912653	2.472101	2.441531
<b>Std. Dev.</b>	0.124873	0.362446	0.147396	0.773367	0.381781
<b>Skewness</b>	1.053473	-1.201316	-0.339786	-0.278981	-0.644204
<b>Kurtosis</b>	3.940877	3.041841	2.013914	2.555873	2.586814
<b>Jarque-Bera Probability</b>	7.986701 0.018438	8.661590 0.013157	2.151272 0.341081	0.762854 0.682886	2.746078 0.253336
<b>Sum</b>	273.3914	144.3796	186.3897	144.0997	115.6168
<b>Sum Sq. Dev.</b>	0.545761	4.597849	0.760393	20.93339	5.101492
<b>Observations</b>	36	36	36	36	36

**Table 2: Correlation Matrix**

<b>VARIABLES</b>	<b>LNGDP</b>	<b>LNEXD</b>	<b>LNREM</b>	<b>LNFDI</b>	<b>LNAID</b>
<b>LNGDP</b>	1	0.865084	0.913966	0.924866	0.807052
<b>LNEXD</b>	0.865084	1	0.858198	0.869209	0.738426
<b>LNREM</b>	0.913966	0.858198	1	0.945985	0.836655
<b>LNFDI</b>	0.924866	0.869209	0.945985	1	0.900503
<b>LNAID</b>	0.807052	0.738426	0.836655	0.900503	1