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Foreign Direct Investment and Rwanda's Economic Performance (1970-2011)

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Abstract
In the past two decades, Rwanda has experienced economic transformation which has attracted international investors. However, it is not clear whether these investment flows have made a significant contribution to economic growth. Such information is important for policy making so as to evaluate the impact of current policy efforts and design future strategies. The main objective of this study was to assess the impact of foreign direct investment (FDI) on Rwanda's GDP growth per capita from 1970 to 2011. The study was based on two hypotheses which related GDP growth per capita and FDI using World Bank data. Two multiple regression models were estimated. In addition, tests for normality, autocorrelation, heteroscedasticity and multicollinearity were conducted and corrected. In the first model with GDP per capita growth as dependent variable, four variables namely rural population growth, exports, imports and inflation had a statistically significant effect while FDI was insignificant at the 5% level. In the second model, with FDI as dependent variable, rural and urban population growths were statistically significant. However, GDP per capita growth was not statistically significant. These results have policy implications on the country's export strategy, inflation and population growth rates.
Keywords: Economic growth per capita, East Africa, foreign direct investment, multiple regression, Rwanda

1. Introduction

Rwanda is a country located in East Africa with an estimated surface area of about 26,000 km^2 and a population of around 11 million people (NISR Indicator Reports, 2011). The country has the highest population density in Africa with about 550 people per square km (MININFRA, 2011). The Rwandan economy is anchored on agriculture with 90% of the people relying on it for their livelihoods (Rurangwa, 2002). Land is therefore an important natural resource but also a heavily contested asset (Rurangwa, 2002). In 2000, the country's budget deficit was 1.3% of the GDP while in 2010 it was 1.6% of the GDP (EAC macro Report, 2011). The country's total budget in 2011 was 1,116.9 billion Rwandan francs (1.8 billion US$) with agriculture receiving around 67.1 billion Rwf (0.106 Billion US$) (MINECOFIN, 2011). In order to supplement locally generated revenues, the government has been relying on foreign direct investment and foreign aid (MINECOFIN, 2011).

This paper focuses on Rwanda's foreign direct investment inflows and implications on GDP growth per capita. Foreign aid involves voluntary transfers of money from one country to another mainly to reduce poverty and improve overall development prospects (Xu et al., 2010). Many political leaders in Africa are not comfortable with foreign aid because donor countries expect something in return (Dudley & Montmarquette, 1976). On the other hand, foreign direct investment improves access to new markets, technology and facilities (Xu et al., 2010). According to Breton Woods's institutions, foreign direct investment indicates the lasting interest of local investors in other countries (OECD, 1999). In 2008, foreign direct investment accounted for 12% of the total amount of investment received in Rwanda (NISR GDP National Accounts, 2011). The extent to which foreign direct investment has impacted on Rwanda's economic growth efforts is not clear. This study considers the period from 1970 to 2011. According to Figure 1, FDI has been relatively constant while GDP has typically followed a cyclical pattern.

Economic theory posits that there is an association between economic growth and foreign direct investment through its effect on technology accumulation (Findley, 1978; Wang, 1990). Foreign direct investment is often seen as a vehicle for enhancing economic growth for less developed countries (LDC) which are faced by numerous problems such as high inflation rates, high unemployment, and low industrial output (Tsai, 1994). The endogenous growth theory argues that economic growth of a given country is affected by endogenous factors such as capital, knowledge and intermediate goods (Aghion & Howitt, 1997). Analytical techniques used in many studies include ordinary least squares (for example Agrawal, 2011), augmented growth models, two stage least squares, threshold regression analysis (Jyun & Chih, 2008), and simultaneous equation systems (Blomstrom et al., 1996, Balasubramanyam et al., 1996, Borenzstein et al., 1999). There seems to be a dearth of related studies in Africa and particularly in Rwanda (Ajayi, 2003, Ayanwale, 2007, No et al., 2003).

The main objective of this paper is to ascertain the impact of FDI on Rwanda's economic growth per capita from 1970 to 2011. The specific objectives are to: (1) quantify the relationship between economic growth per capita and FDI and other economic variables for Rwanda (2) analyze the determinants of FDI when regressed against a vector of economic variables using the same data source. Following studies by Suker et al., (2011), Ayanwale et

al., (2007) and Borenzstein et al., (1999), the following hypotheses have been formulated.
1. There is no statistically significant relationship between economic growth per capita and FDI.
2. There is no statistically significant relationship between FDI and economic growth per capita.

2. Conceptual framework of economic growth and its determinants

This section considers the relationship between economic growth per capita and key variables that include foreign direct investment, population growth, exports, imports, inflation and government expenditure because growth is multi-dimensional (Pistoresi & Rinaldi, 2012). These are important because in most studies, economic growth per capita is related to these underlying variables (Suker et al., 2011, Ayanwale et al., 2007 and Borenzstein et al., 1999, Arize et al., 2004). Exports are goods and services which are made in a given country and sold to other countries as a way of generating foreign currency (Todaro, 1995). 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 (Balassa, 1978; Bhagwati, 1978; Edwards, 1998). Companies can get access to the much needed advanced technology especially from developed countries (Coe & Helpman, 1995). 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 (Iscan, 1998).
In most of the studies, inflation has a negative impact on economic growth (Sarel, 1996). Nevertheless, there are some levels of inflation which can be treated as tolerable to stimulate business activity through prices (Ghosh & Phillips, 1998). Barro (1995) observed that households are affected negatively by inflation because of its impact on real incomes. Government expenditure especially at high levels tends to affect economic growth by increasing interest rates for the private sector and therefore dampening investment prospects (Ram, 1986). On the other hand, public spending on education impacts positively on economic growth as a result of the improvement in human capital (Hansson & Henrekson, 1994).
Two arguments are often posited for the relationship between population and economic growth. On the one hand, burgeoning rural populations can cause environmental degradation and thus loss of natural capital but it can also be as source of labor for agricultural activities (Todaro, 1995). Urban populations are typically characterized by people with relatively high education levels which can positively impact on economic growth prospects in less developed nations (Todaro, 1995). Interest rates have a positive impact on economic growth by influencing the levels of savings in an economy (Costas & Smith, 1998). Therefore, a priori expectation is that if interest rates are high, savings are also high culminating in improved economic activity (Costas & Smith, 1998). In addition, high costs of borrowing can negatively affect investment in a country.
Studies on the impact of FDI on GDP per capita growth have often found conflicting results. In Nigeria, Ayanwale (2007) studied the impact of FDI on the country's economic growth and observed a positive association between the two variables. Only one related study on Rwanda by No et al., (2003) was found. No's study revealed that there was a positive relationship between FDI and economic growth in Rwanda. These studies are however contradicted by Sukar et al., (2011) who examined the impact of FDI for selected African countries from Sub Sahara from 1975 to 1999. Their results pointed out a weak relationship between the two variables. This paper has been motivated by the lack of relevant studies in Rwanda.

3. Methodology

3.1 Data set

Time series data from 1970 to 2011 was used in this study. This data set was obtained from World Bank's website. The variables of interest include GDP per capita growth (annual %), population growth rates (annual %), investment growth (annual %), foreign direct investment (% of GDP), inflation (annual %), government consumption (% of GDP), exports (% of GDP) and imports (% of GDP). All economic variables were expressed in constant terms and therefore taking inflation into account.

3.2 Analytical Framework

Following the basic provisions of the endogenous growth theory (Tsai, 1994), the multiple regression models (semi-log) were set as follows:

$$(1)\, Y_{it} = \lambda \ln Y_{it-1} + \alpha X_{it} + \upsilon FDI + u_i$$

where Y is the GDP per capita growth (annual %), Y_{t-1} is the lag of the log GDP per capita growth, X represents a combination of variables which affect economic growth and FDI is the foreign direct investment expressed a percentage of the GDP. Other independent variables which are part of the vector X, informed by the above studies, are rural population growth (annual %), urban population growth (annual %), exports of goods and services (% of GDP), government expenditure (% of GDP), imports of goods and services (% of GDP), inflation (annual %) and public spending on education (% of GDP). For FDI, following Suker et al., (2011), the model was set as follows:

$$(2)\ FDI_{it} = \lambda \ln Y_{it-1} + \alpha X_{it} + \upsilon Y_{it} + u_i$$

where FDI reflects the percentage of foreign direct investment in period *t* expressed as a percentage of GDP, *X* is a set of variables affecting economic growth, and *Y* is the GDP per capita growth (annual %).

3.3 Testing for the assumptions of the multiple regression model

In this study, four assumptions of the multiple regression model were tested and these are the normality assumption, heteroscedasticity, autocorrelation and multicollinearity. The Shapiro-Wilks (SW) test was used to determine if the error term is normally distributed since this influences further hypothesis testing (Gujarati & Porter, 2009). Furthermore, the SW test is normally used for small sample sizes of less than 50. Multicollinearity diagnostics were conducted using the variance inflation factor (VIF), condition index (CI) and tolerance values (TOL). In testing for the presence of heteroscedasticity, the Goldfeld-Quandt test was used while heteroscedastic consistent standard errors were used to correct the problem in the models. Since the models contained a lagged *Y* variable, the Durbin's *h* and *t* statistics were used to detect the presence of autocorrelation. In one of the models, the Durbin's *h* statistic could not be generated and option of using Durbin's *t* statistic was taken. According to Durbin (1970), the *h* and *t* statistics are conceptually the same.

4. Results

This section is subdivided into two main parts. The first section summarizes the key economic variables while the second part presents tests of hypotheses which are outlined in the paper's introductory part.

4.1 Summary of Rwanda's economic variables from 1970-2011

Table 1 depicts the means of the key economic variables affecting Rwanda over the last 41 years. It can be observed that Rwanda's economic performance, as reflected by the GDP per capita, has improved by an average of 3.03% per annum over the last four decades. This is attributed to a number of pro-poor policy initiatives that the government has been implementing (GoR, 2011). Examples of such strategies include the one cow per household, land use consolidation, crop intensification and villagisation (GoR, 2011; Issaksson, 2013). This is higher than the average annual GDP growth per capita for Africa which was 0.9% between 1970 and 1990 and 2.1% between 1990 and 2010 (UN Data, 2012).

Foreign direct investment for the country increased by a small margin of 0.67% over the forty year period and this is in sharp contrast to other countries such as Uganda, Tanzania and Cameroon whose FDI accounted for about 30% of GDP (Bhinda & Martin, 2009). Foreign direct investment inflows are usually affected by the socio-political system and therefore volatile (UNDP, 2012). According to this study's results, the urban and rural populations grew by about 2% and 6% respectively over 41 years. The higher urban population growth is mainly attributed to rural to urban migration in the country (Gakwandi, 2008). In addition, the average household size in the country is 6 people per family (GoR, 2011).

Imports grew more rapidly (23.02%) when compared with exports (9.92%) over the study period. This is because Rwanda's economy has a few industrial opportunities creating the need for importation of basic goods and services (GoR, 2011). The country's main exports are tea and coffee but the government has been promoting the diversification of the export base to include horticulture (MINICOM, 2011). The negative balance of trade (BOT) situation is not only peculiar to Rwanda but also to other countries in Africa (UN Data, 2012).

In terms of government expenditures, Rwanda government spent an average of 13.22% of the GDP. This is much lower than found by Fan & Saurkar (2012) who reported that public expenditures for many African countries as a percentage of the GDP hovered between 27-34%. Public spending in the education sector increased during the same period. Government's effort to improve the education level in the country is reflected by programs such as 12 years Basic Education Scheme which provides opportunities for primary and secondary school going children (GoR, 2011). Inflation rate increased by around 10% over the last 41 years in Rwanda and this is slightly higher than the African average of 6.7% in 2012 (IMF, 2012). Similarly, interest rates also increased over the same period.

4.2 Impact of FDI on GDP per capita growth

In attempting to answer the hypotheses of the study, a multiple regression model was developed. Following similar studies such as Suker et al., (2011), the lagged real income growth variable was expressed in terms of its natural logarithm. The results of the regression model are depicted in table 2.

According to the above model inflation rate and exports had a statistically significant effect on GDP per capita growth ($p<0.05$) ceteris paribus. The partial regression coefficient associated with exports implies that if exports are increased by 1%, GDP per capita will grow by 0.57%, holding foreign direct investment, rural population, urban population, government expenditure, imports, inflation, interest rates and public spending on education variables constant. This is consistent with a priori expectations whereby exports have a positive impact on the economy through foreign currency generated which is used to acquire new innovations and eventually trickles down to the society in the form of higher incomes (Edwards, 1998). Furthermore, inflation had a negative effect

on per capita income holding other independent variables constant. The partial regression coefficient of inflation is -0.13 and this suggests that if inflation increases by 1%, then per capita income decreases by 0.13% holding other independent variables constant. This is not surprising since inflation has a negative effect on the real purchasing power of money (Sarel, 1996).

The partial regression coefficient for FDI is negative and rather unexpected. This is possible in cases FDI crowds out rather than complement domestic investment resulting in a negative or insignificant relationship (Carkovic & Levine, 2002). Several studies have found such a relationship as noted by Li & Liu (2004). Since, the partial regression coefficient for FDI is not significant, the null hypothesis is not rejected meaning that FDI does not have an effect on per capita income. These results are corroborated by Suker et al., (2011) and Ayanwale et al., (2007) who observed that FDI did not have a significant impact on economic growth per capita. Borenzstein et al., (1999) suggested that FDI has an impact on economic growth if a given country has a minimum threshold of initial income and human capital. However, they are different from No et al., (2003) who observed a positive relationship between FDI and economic growth per capita.

All other independent variables including lagged per capita income, rural population, urban population, government expenditure, imports, interest rates and public spending did not have statistically significant impact on per capita income. In terms of goodness of fit, the adjusted R^2 indicated that 0.2198% of the total variation in GDP per capita growth is explained by the variables included in the model. However, the overall model is significant given that the p-value of the F test is less than 5%.

4.3 Impact of economic growth per capita on FDI

As suggested by similar studies, FDI was also regressed economic growth per capita and a set of other economic variables. The results are shown in table 3. It is clear that foreign direct investment is significantly influenced by urban population growth (%) and imports ($p<0.05$). The urban population is a small proportion of the population and most of them rely heavily on imported products potentially exerting a negative effect on foreign direct investment (EAC 2012). Holding other independent variables constant, a 1% change in imports results in a 0.067% increase in foreign direct investment. This suggests that the more imports a country has the greater the opportunities for investment for foreign companies (Sarel, 2006). Since the partial regression coefficient of GDP per capita income growth is not significant, the null hypothesis that "per capita income does not affect foreign direct investment" is not rejected. The collective effect of independent variables included in the model is significant since the p-value associated with the F-test is less than 5%. Since there is no statistically significant relationship between FDI and GDP per capita growth, these results suggest that the endogeneity problem may not be a problem in this period. The adjusted R squared indicated that about 45% of the total variation in foreign direct investment is explained by the included independent variables.

4.4 Tests of normality, multicollinearity, heteroscedasticity and autocorrelation

One of the central requirements in hypothesis testing is the need to verify if the dataset satisfies the normality assumption (Gujarati & Porter, 2009). In this context, various estimates of normality were tested and these results are shown in table 4. According to the S-W test statistic, the error term is normally distributed permitting hypothesis tests to be carried out. Since the intercept is included in the models, it implies that the expectation of the error term is equal to zero. Multicollinearity diagnostics were conducted for the two multiple regression models. The first model had economic growth per capita as the dependent variable. VIF and CI values are generally less than 10 and 30 respectively indicating moderate to strong presence of multicollinearity in the model. This is further confirmed by the TOL values which are not less than 0.1. The results are presented in tables 5 and 6. Model 2 considered FDI as the dependent variable. In the model, VIF and CI values are less than 10 and 30 which also depicts moderate to strong multicollinearity. According to the Goldfeld-Quandt test, only 3 independent variables were not heteroscedastic in the model with GDP per capita growth as dependent variable. These are urban population growth, imports and interest rates. In the second model in which FDI is the dependent variable, all explanatory variables were heteroscedastic.

Tables 9 and 10 show the heteroscedastic consistent standard errors, t and p values. In the first model with GDP per capita growth as dependent variable, rural population growth, exports and imports influenced GDP per capita growth positively while inflation and rural population growth had a negative effect, ceteris paribus. The signs of partial regression coefficients were consistent with a priori expectations and significant at the 5% level. FDI still remained insignificant. The adjusted R^2 was 0.4 and significant at the 5% level. In the second model, rural population growth positively influenced FDI while urban population growth negatively influenced it. GDP per capita did not have a significant effect on FDI, ceteris paribus. The adjusted R^2 for this model was 0.44 and significant at the 5% level.

In the first model with GDP per capita as dependent variable, autocorrelation was not present as depicted by the Durbin's *t* statistic of -0.7642 ($p = 0.2292$). In the second model Durbin's *h* statistic 0.928 ($p = 0.1768$) indicating no autocorrelation at the 5% level. Therefore autocorrelation is not present in the second model (tables 11 and 12).

5. Conclusions and recommendations

The main objective of this study was to assess the impact of FDI on Rwanda's economic growth per capita from 1970 to 2011. In order to answer this objective, two hypothetical propositions were given whereby FDI and economic growth per capita were related to each other. Two multiple regression models were developed following similar studies such as Suker et al., (2011) and Ayanwale et al., (2007). The results showed that FDI did not significantly affect economic growth per capita. In the first model with GDP per capita growth as dependent variable, four variables namely rural population growth, exports, imports and inflation had a statistically significant effect, ceteris paribus. In the second model, with FDI as dependent variable, rural and urban population growths were statistically significant. It is therefore prudent to focus on policies that curtail rural population growth, imports and inflation while increasing exports. Examples of such initiatives include horticulture, mining and products from small to medium enterprises. Although FDI is important, the country should not make it the only priority in terms of attracting new investment opportunities.

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Table 1. Summary of key economic variables for Rwanda (1970-2011).

Variable	Mean	Std Dev	Minimum	Maximum
GDP per capita growth	3.03	7.15	-7.35	37.12
FDI	0.67	0.57	0.00	2.26
Rural population growth	2.19	3.36	-8.15	8.54
Urban population growth	6.95	4.41	0.87	19.71
Exports	9.92	3.43	5.15	21.05
Government expenditure	13.22	2.80	8.73	20.03
Imports	23.02	7.96	13.44	64.79
Inflation	10.03	15.67	-7.02	87.97
Interest rates	6.54	7.21	-5.82	22.62
Public spending on education	1.41	1.93	0	5.67

Table 2. Multiple regression results on the impact of FDI and other variables on GDP per capita growth (1970-2011).

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	-15.10891	5.15295	-2.93	0.0058
Lag *ln* GDP per capita	0.03347	0.11330	0.30	0.7694
FDI	-2.55651	1.90451	-1.34	0.1879
Rural population growth	-0.58428	0.41534	-1.41	0.1681
Urban Population growth	0.23501	0.32403	0.73	0.4730
Exports	0.57663	0.29783	1.94	0.0607
Government expenditure	0.44281	0.36252	1.22	0.2298
Imports	0.41594	0.25941	1.60	0.1176
Inflation	-0.13732	0.05874	-2.34	0.0251
Interest rates	-0.04152	0.15076	-0.28	0.7846
Public spending on education	-0.30793	0.52760	-0.58	0.5631
F= 2.30, p=0.0332,				

Table 3. Multiple regression results on the impact of GDP per capita and other variables on foreign direct investment.

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	-0.81435	0.47062	-1.73	0.0921
Lag *ln* GDP per capita	-0.01865	0.01389	-1.34	0.1879
GDP per capita	0.00454	0.04150	0.11	0.9143
FDI	0.00534	0.00965	0.55	0.5830
Rural population growth	0.05186	0.03539	1.47	0.1515
Urban Population growth	-0.06938	0.02536	-2.74	0.0096
Exports	0.04237	0.02578	1.64	0.1089
Government expenditure	-0.00135	0.03159	-0.04	0.9662
Imports	0.06739	0.01999	3.37	0.0018
Inflation	-0.00384	0.00535	-0.72	0.4769
Interest rates	-0.00800	0.01282	-0.62	0.5366
Public spending on education	0.03532	0.04489	0.79	0.4365

Table 4. Normality test of the error term.

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.965652	Pr < W	0.2343
Kolmogorov-Smirnov	D	0.125941	Pr > D	0.0918
Cramer-von Mises	W-Sq	0.088968	Pr > W-Sq	0.1557
Anderson-Darling	A-Sq	0.520155	Pr > A-Sq	0.1839

Multicollinearity diagnostics.
Table 5. Dependent variable per capita income growth.

Variable	Tolerance	Variance Inflation	Condition Index
Intercept	.	0	1
Lag *ln* GDP per capita	0.76784	1.30236	2.43
FDI	0.44190	2.26297	3.30
Rural population growth	0.40692	2.45747	3.46
Urban Population growth	0.31988	3.12615	4.22
Exports	0.62214	1.60736	4.27
Government expenditure	0.51464	1.94310	5.61
Imports	0.33154	3.01621	8.95
Inflation	0.69922	1.43016	14.74
Interest rates	0.45308	2.20712	22.19
Public spending on education	0.58792	1.70090	23.20

Multicollinearity diagnostics.
Table 6. Dependent variable foreign direct investment.

Variable	Tolerance	Variance Inflation	Condition Index
Intercept	.	0	1
Lag *ln* GDP per capita growth	0.62685	1.59527	2.31
GDP per capita growth	0.25798	3.87625	2.75
FDI	0.76828	1.30161	2.62
Rural population growth	0.40783	2.45198	3.37
Urban Population growth	0.38038	2.62894	3.71
Exports	0.61243	1.63283	4.49
Government expenditure	0.49460	2.02183	4.82
Imports	0.41659	2.40044	7.45
Inflation	0.61946	1.61430	14.40
Interest rates	0.45760	2.18529	19.22
Public spending on education	0.59119	1.69152	24.14

Table 7. Detection of Heteroscedasticity using Goldfeld-Quandt test in multiple regression model with dependent variable GDP per capita growth.

Variable	RSS2	RSS1	Calculated F	Decision (compare with F (14,14), α=0.05, F=2.46
FDI	425.859	1361.679	3.197	Heteroscedasticity present
Rural Population growth	466.687	1314.835	2.81	Heteroscedasticity present
Urban population growth	416.109	331.657	1.26	Heteroscedasticity not present
Exports	356.386	1383.623	3.88	Heteroscedasticity present
Government expenditure	474.450	1448.546	3.05	Heteroscedasticity present
Imports	1066.021	532.364	2.00	Heteroscedasticity not present
Inflation	1456.96	362.197	4.02	Heteroscedasticity present
Interest rates	286.306	368.444	1.29	Heteroscedasticity not present
Public spending on education	225.562	1659.936	7.36	Heteroscedasticity present
Lagy	177.570	1632.239	9.20	Heteroscedasticity present

Table 8. Detection of Heteroscedasticity using Goldfeld-Quandt test in multiple regression model with dependent variable FDI.

Variable	RSS1	RSS2	Calculated F	Decision (compare with F (14,14), α=0.05, F=2.46
Rural Population growth	4.147	1.431	2.89	Heteroscedasticity present
Urban population growth	4.718	0.739	6.38	Heteroscedasticity present
Exports	0.966	5.646	5.84	Heteroscedasticity present
Government expenditure	1.365	7.256	5.32	Heteroscedasticity present
Imports	1.052	8.869	8.43	Heteroscedasticity present
Inflation	1.858	7.888	4.25	Heteroscedasticity present
Interest rates	1.065	2.657	2.49	Heteroscedasticity present
Public spending on education	1.352	5.145	3.81	Heteroscedasticity present
Lagy	1.337	7.062	5.28	Heteroscedasticity present

Table 9. Multiple regression model with heteroscedasticity consistent standard errors (Dependent variable Per capita income growth).

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent		
					Standard Error	t Value	Pr > |t|
Intercept	-18.53448	4.78601	-3.87	0.0006	4.69702	-3.95	0.0005
Lagy	-0.33420	0.63479	-0.53	0.6027	0.67847	-0.49	0.6262
FDI	-1.11977	1.65544	-0.68	0.5043	1.14751	-0.98	0.3375
Rural population growth	-0.84775	0.33579	-2.52	0.0175	0.37509	-2.26	0.0318
Urban population growth	0.50475	0.26907	1.88	0.0711	0.24892	2.03	0.0522
Exports	0.62570	0.23504	2.66	0.0127	0.15169	4.12	0.0003
Government expenditure	0.62815	0.29023	2.16	0.0391	0.32042	1.96	0.0600
Imports	0.31889	0.20176	1.58	0.1252	0.15545	2.05	0.0497
Inflation	-0.12014	0.05088	-2.36	0.0254	0.04025	-2.98	0.0058
Interest rates	0.01154	0.12072	0.10	0.9245	0.09658	0.12	0.9057
Public spending on education	0.33727	0.40226	-0.84	0.4089	0.28465	-1.18	0.2460
Adj R^2=0.40, p=0.0044							

Table 10. Multiple regression model with heteroscedasticity consistent standard errors (Dependent variable FDI).

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent		
					Standard Error	t Value	Pr > |t|
Intercept	0.12951	0.53632	0.24	0.8109	0.41349	0.31	0.7564
Lagy	0.07959	0.06966	1.14	0.2625	0.04292	1.85	0.0739
Rural population growth	0.08443	0.03425	2.47	0.0199	0.02792	3.02	0.0052
Urban population growth	-0.08956	0.02519	-3.56	0.0013	0.02151	-4.16	0.0003
GDP per capita income growth	0.00454	0.04150	0.11	0.9143	0.03173	0.14	0.8881
Exports	0.03244	0.02567	1.26	0.2163	0.01731	1.87	0.0709
Government expenditure	-0.02444	0.03224	-0.76	0.4545	0.03018	-0.81	0.4247
Imports	0.04265	0.02120	2.01	0.0536	0.02375	1.80	0.0829
Inflation	0.00078131	0.00571	0.14	0.8920	0.00211	0.37	0.7135
Interest rates	-0.00843	0.01345	-0.63	0.5355	0.00988	-0.85	0.4000
Public spending on education	0.03993	0.04451	0.90	0.3770	0.04561	0.88	0.3885
Adj R^2=0.44, p=0.0012							

Table 11. Tests for autocorrelation.
Model 1: Dependent variable GPD per capita growth

Miscellaneous Statistics			
Statistic	**Value**	**Prob**	**Label**
Durbin's t	**-0.7642**	**0.2292**	**Pr > t**

Note: Durbin h cannot be obtained. The t-statistic is given.

Table 12. Tests for autocorrelation.
Model 2: Dependent variable FDI

Miscellaneous Statistics			
Statistic	Value	Prob	Label
Durbin h	0.9275	0.1768	Pr > h

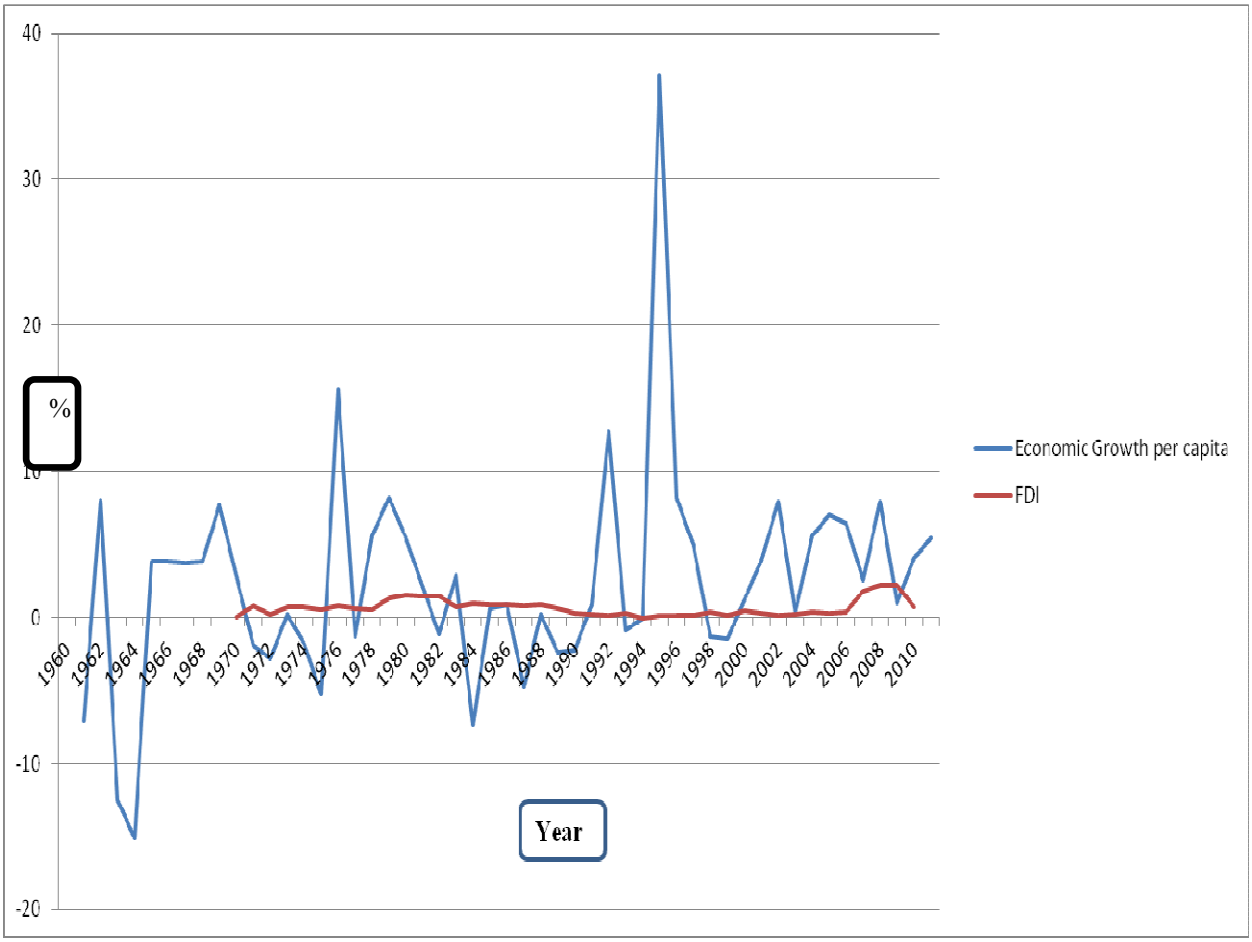

Figure I. FDI (%) and GDP per capita (%) for Rwanda from 1960-2011 (US$)
Data Source: World Bank (2011)

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