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Effect of Fiscal Policy on Investment Growth in Rwanda

Gerald Mugabe[1], Dr. Patrick Mulyungi[2]

[1]Student, Jomo Kenyatta University of Agriculture and Technology

[2]Lecturer, Jomo Kenyatta University of Agriculture and Technology

Abstract: ***Investment has been recognized as one of the pillars for achieving sustainable economic growth. From different studies done in Rwanda on investment, none of them assessed the effect of fiscal policy on investment in Rwanda intensively disaggregate fiscal policy variables. The effects of fiscal policy on investment have therefore not received much attention despite the fact that the Rwandan government has intensively used fiscal policy for its promotion. The general objective of the study is to analyze the effect of fiscal policy on investment growth in Rwanda. This study was used both descriptive and analytical research design. Ordinary Least Square (OLS) method was employed in analyzing time series data captured over the period under study. Granger casualty test used to test causality relationship between fiscal policy and investment growth. The study used annual time series data spanning from 2000 to 2017. The residual is stationary, t-statistic (-4.927723) is less than critical value (-1.961409) and the probability (0.0001) is less than 5% and this table shows that the Durbin- Watson Stat is greater than R^2 which is (1.131954) >(0.953128). Basing on those results, the researcher found that R-squared is significant at 95%. This means that three fiscal policy contributed to the investment growth of Rwanda. The results shows that all independent variables have positive impact on investment growth, all coefficients of variables have positive sign, (5.265210) Tax, (4.012108) Gd and (2.516107) FCI. This shows that fiscal policy has been contributed positively on investment growth in Rwanda from 2000-2017. The development of fiscal policy is important in sustaining investment growth. The co-integration test illustrates that the variables were co-integrated and implying that a long run relationships exists on the investment growth in Rwanda. Therefore researcher accepts H1#0 and fails to reject H0. The findings of this study call for government of Rwanda intervention in three areas: reexamination of government spending to eventually make it complementary to investment growth; channeling more credit to the private sector and designing appropriate policies that deal with the current high domestic public debt.***

1. Background of the Study

Fiscal policy is the means by which a government adjusts its spending levels and tax rates to monitor and influence nation's economy. It is the sister strategy to monetary policy through which a central bank influences a nation's money supply. These two policies are used in various combinations to direct a country's economic goals. Here we look at how fiscal policy works, how it must be monitored and how its implementation may affect different people in an economy. Fiscal policy is a financial instrument used by the government as a deliberate manipulation of government receipts and expenditures to achieve economic and social objectives and maintain stable growth. Tanzi (2008) mentioned that the main objectives of fiscal policy are to allocate resources, stabilize the economy and redistribute income. He also states that the main tools of fiscal policy are government spending and taxation. To measure the effect of fiscal policy on output, economists usually use the fiscal multiplier. This is defined as the ratio of a change in output (ΔY) to an exogenous change in the fiscal variables (as ΔG or $-\Delta T$), and it takes different approaches (Pieschacon, 2008).

Over past decades, the Rwandan economy has witnessed many shocks and disturbances which had resulted into both internal shocks such as unbalanced investment and consumption patterns and external shocks like genocide, population growth rates and migration, technological transfer and changes. These crises has also affected the activities of most private investors as many of them were frustrated out of business as a result of high cost of production, unstable business environment policies and insecurity etc. However, investment can only flourished in a supportive environment. This however calls for government intervention to regulate, control and curtail the fiscal policy in order to ensure the growth of investment. In 1994 Rwanda suffered huge budget deficits and higher real interest rates than expected when fiscal and monetary authorities operate independently. This happened especially when fiscal authorities were reluctant towards reducing spending decisions. As result, financing of such deficits tend to deviate inflation developments away from their policy targets. In a study by Shabbir and Ahmed (1994) postulate that fiscal deficits directly affected the growth of investment in Rwanda. Likewise, in poorly coordinated macroeconomic environment, fiscal policy remained passive to investment. In this regard, fiscal policy directly affects investment growth (Asante, 2000).

2. Statement of the Problem

Investment has been recognized as one of the pillars for achieving sustainable economic growth (Jayaraman, 2001). Various studies have justified undertaking of economic reforms on the basis that such reforms create a favorable environment for investment by removing the bottlenecks that frustrate investment. Fiscal reforms have been undertaken in Rwanda with an aim of rejuvenating the economy whose growth slowed down hardly during genocide. Tax modernization, tax decentralization and prudent public debt management are examples of reforms that have been undertaken with an aim of making the economy more efficient by giving private investors impetus for establishment. The ratio of investment to Gross Domestic Product in Rwanda in the period 2010 – 2015 averaged 12.7 per cent. This percentage is below the levels being experienced in successful economies and which is

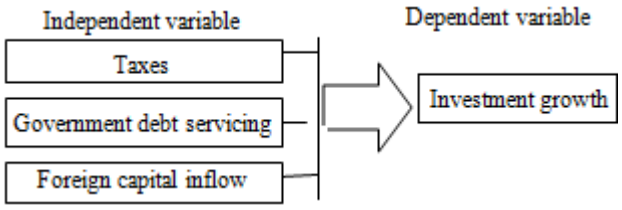
required to spur economic growth needed for employment creation and poverty reduction (World Bank, 2007). In fact the World Bank and Republic of Rwanda stressed on the need to achieve higher economic growth through increased investment.

According to Herandez-Cata (2000), the ratio of investment to GDP averaged 16 per cent in Latin America, 18 per cent in developed countries and 16.5 per cent in newly industrialized countries in Asia. Gillis et al. (1987) proposed that this proportion should not be less than 15 per cent of the GDP at any time, and that the country should target and sustain investment level of at least 20 per cent of GDP. To attain economic growth of 10 per cent and sustain it, investment as a ratio of GDP targets in the Rwanda's National Strategy for Transformation should be at least 21 per cent by the year 2018, and above 24 per cent by the year 2024 (National Strategy for Transformation, 2018). However, in 2007 this ratio was only 12.4 per cent, implying that realizing the set target in the first National Strategy for Transformation can be elusive if efforts are not made to increase investment. From different studies done in Rwanda on investment, none of them assessed the effect of fiscal policy on investment in Rwanda intensively disaggregate fiscal policy variables. The effects of fiscal policy on investment have therefore not received much attention despite the fact that the Rwandan government has intensively used fiscal policy for its promotion. It is therefore not clear what effects fiscal adjustment processes have on investments. This forms the thrust of this study.

3. Objective of the Study

1) To examine the relative effect of various taxes on investment growth in Rwanda
2) To determine the effect of government debt servicing on investment growth in Rwanda
3) To investigate the effect of foreign Capital inflow on investment growth in Rwanda

4. Conceptual Framework



Research Design

Research design is the blue print for the collection, measurement, analysis of data and a plan to obtain answers to research questions. This study was used both descriptive and analytical research design. Ordinary Least Square (OLS) method was employed in analyzing time series data captured over the period under study. Granger casualty test used to test causality relationship between fiscal policy and investment growth.

Source of data and data collection procedures

The study was used secondary data. The study used annual time series data spanning from 2000 to 2017. Data for study was obtained from MINECOFIN, National Institute of Statistic of Rwanda and Rwanda Central bank.

Model specification

In line with the conceptual framework, the model of this study was composed by IVGt as dependent variable and tax, fiscal policy and government debt.

Model in linear-from $IVG=\beta0+\beta1Tax+\beta2G+\beta3FCI+\varepsilon t$

IVGt = Investment growth at time t;

Taxt = Tax at time t;

Gd= Government debt t;

FCI t =Foreign capital inflow t;

$\beta0$= intercept; ε_t = Error term; t after each variable is the time subscript.

β_1& β_3= Coefficients of each of the independent variable.

4.1 Model development

Economic growth or GDP = dependents variable x_1 –x_3 are independent variables (f) represents the functional notation. This can be specifically stated as:

$IVGt = f(\text{Tax}, Gd, \text{FCI}t)$ ……. *(1)*

$\log(\text{IVGt}) = \beta0 + \beta1\log(\text{Tax}) + \beta2\log(Gd) + \beta3\log(\text{FCI}t) + \varepsilon$ ……*(2)*

$\log(\text{IVG})t = \beta0 + \beta1\log(\text{Tax})t + \beta2\log(Gd)t + \beta3\log(\text{FCI}t) + \varepsilon$ ……*(3)*

Test of stationarity

To test the stationarity, the unit root test was used or Dickey Fuller (DF) test, that would allow making the characteristic stationary or no chronologic series. There the simple Dickey Fuller test which suppose the error term to be white noise. The Augmented Dickey Fuller test (ADF) takes a reference from hypothesis. The DF and ADF tests using three models including one or many autoregressive differential.

In order to make the good analysis, the researcher starts by analyzing the model:

$IVGt=\beta0+\beta_1Taxtt+\beta_2Gdt+\beta_3FCIt+\varepsilon$

This model is composed by some variables which the data was collected in billion, million and thousand. This model is the linear model and it is not easy to analyze it because all data are not picked in the same amount, that is why the researcher wants to introduce (Ln) in this model in order to avoid the spurious problem and it was became the log-log model.

Linear model: $IVGt=\beta_0+\beta_1Taxt+\beta_2Gdt+\beta_3FCIt+\varepsilon$

Log-log model: $LNIVGt=\beta_0+\beta_1LNTaxt+\beta_2LNGdt+\beta_3LNFCI+\varepsilon t$

A stochastic process satisfying the above conditions is said to be weakly stationary. A time series that does not satisfy these conditions is said to be no- stationary. So a non-stationary process was varying over time a changing or both.

A non- stationary process can be stationarized by differencing it n^{th} times. A time series is said to be integrated of order d, written I (d), when after being differencing it "d" times it becomes stationary. A series is integrated of order zero when it is stationary at level (Tharawanji, 2009).

5. Research findings and discussion

Table 1: Unit root test

Unit root test at second different							
Variables		ADF	CV	Prob	R squared	DW	LAG
IVG	Intercept	-6.586211	-2.452146	0.0000	0.548906	2.265868	2
Tax	Intercept	-5.014573	-2.963953	0.0000	0.473163	1.423331	2
Unit root test at level							
Gd	Intercept	-4.654608	-2.530442	0.0000	0.637653	2.423743	2
Unit root test at level at second different							
FCI	None	-22.33286	-1.954414	0.0000	0.432145	1.621913	2

Source: Computed by Researcher using E-views version 7

Referring to above table, researcher observes that IVG is stationary at level of intercept at lag 2 and Tax is stationary at intercept on lag 2 while Gd and FCI were stationary at intercept and None in lag 2.

5.1 Test of Residuals

By using the ADT Unit Root test on the residuals estimated from the co- integrating regression, the Econometric package E-views version 7 gives the following results.

Table 2: Residuals test

Null Hypothesis: R has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.927723	0.0001
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(R)
Method: Least Squares
Date: 31/10/18 Time: 15:02
Sample (adjusted): 2000- 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R(-1)	-0.883704	0.472104	-1.871843	0.0001

R-squared	0.953128	Mean dependent var	338.3694
Adjusted R-squared	0.095128	S.D. dependent var	2307.612
S.E. of regression	2195.110	Akaike info criterion	18.26091
Sum squared resid	1.302.08	Schwarz criterion	18.30849
Log likelihood	-254.6528	Hannan-Quinn criter.	18.27546
Durbin-Watson stat	1.131954		

Source: Computed by Researcher using E-views version 7.

Referring to the above Table 2 the residual is stationary, t-statistic (-4.927723) is less than critical value (-1.961409) and the probability (0.0001) is less than 5% and this table shows that the Durbin- Watson Stat is greater than R^2 which is (1.131954) >(0.953128). Basing on those results, the researcher found that R-squared is significant at 95%. This means that three fiscal policy contributed to the investment growth of Rwanda.

Estimation of model

To estimate the long run relation between variables
Model: $IVGt=\beta_0+\beta_1 Taxt+\beta_2 Gdt+\beta_3 FCIt+\varepsilon$
After analyzing the stationarity by using the ADF Unit Root test, let's estimate this model by taking into the consideration the model of the variables that are stationary.

Table 3: Co-integration (Long run relationship)

Dependent Variable: IVG
Method: Least Squares
Date: 31/10/18 Time: 17:46
Sample: 2000 2017
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Tax	5.265210	1.712110	3.418454	0.0019
Gd	4.012108	2.911208	1.274603	0.0066
FCI	2.516107	2.082507	1.351976	0.0072
C	0.022778	624.2051	0.455424	0.6523

R-squared	0.055132	Mean dependent var	1467.438
Adjusted R-squared	0.219610	S.D. dependent var	2282.372
S.E. of regression	2016.240	Akaike info criterion	18.17232
Sum squared resid	1.142408	Schwarz criterion	18.35554
Log likelihood	-286.7572	Hannan-Quinn criter.	18.23306
F-statistic	3.907913	Durbin-Watson stat	1.691052
Prob(F-statistic)	0.018909		

Estimation Equation:
IVG = C(1)*Tax + C(2)*Gd+C(3)* FCI
Substituted Coefficients:

IVG =5.265210 *Tax +4.012108*Gd+2.516107*FCI
β0=0.022778
GDP=0.022778+5.265210 Tax+4.012108Gd +2.516107FCI

Co-integration is an econometric property of time series variables. If two or more variables are themselves non-stationary, but a linear combination of them is stationary, the theory of time series are said; to be co integrated it is often said that co integration is a means for correctly testing hypothesis concerning the relationship between two variables having unit roots. Testing co integration, there are two most popular approaches, the Engle Granger (EG) two steps method and Johansen procedure. The first is analysis of stationarity for the residuals from the levels regression.

The variables were co- integrated; all variables have a long run relationship between them. Therefore, the researcher confirms that all variables are co-integrated and there is long run relationship between variables.

6. Discussion and Interpretation

The results of the relationship of fiscal policy and investment growth presented in Table 3. It is clearly visible from the results that fiscal policy influences the process of investment growth in Rwanda. Both variables of the study

model (fiscal policy) affected the investment growth positively and significantly.

IVG=0.022778+5.265210 Tax+4.012108Gd +2.516107 Fci

The results shows that all independent variables have positive impact on investment growth, all coefficients of variables have positive sign, (5.265210) Tax, (4.012108) Gd and (2.516107) FCI. This shows that fiscal policy has been contributed positively on investment growth in Rwanda from 2000-2017. When Tax increased 1 unit, holding Gd and Fci constants, IVG expected to increase (5.265210). This shows that all variables contributed positively on investment growth. R^2 (0.055132) this show the goodness of fit the model. Even if R^2 is still small but the variables used on this research are not only contributed to the investment growth in Rwanda, they were others variable which contributes to the investment growth in Rwanda.

Error correction model (ECM)

Error Correction Models (ECMs) is a category of multiple time series models that directly estimate the speed at which a dependent variable (Robin Best, 2008).

Y - Returns to equilibrium after a change in an independent variable - X.

ECMs are useful for estimating both short term and long term effects of one time series on another.

ECMs are useful models when dealing with integrated data, but can also be used with stationary data. The dynamic relation established by the model with correction of error ECM is deducted from relation of long term rising from the method of Engel and Granger, the characteristics of the models with correction of the error is to combine in the same specification of the effects of that short term with those of the long term, thus all the information of long term on the level of variables is stored in the model (Judith, 2011).

Around the long run relationship, the error correction model permits to integrate the short run fluctuations, if the coefficient comes negative it would change model in the long run equilibrium so with E-views the long run model was done the short run model.

Table 4: Error correction model

Dependent Variable: IVG
Method: Least Squares
Date: 31/10/18 Time: 18:04
Sample (adjusted): 2010 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.082806	614.2038	1.622068	0.1169
Tax	3.432410	1.94E-10	0.994922	0.0029
Gd	0.212108	5.152408	1.790498	0.0050
Fci	2.201208	2.061207	0.252162	0.0029
R(-1)	-0.085066	0.439025	-0.330257	0.0026

R-squared	0.066016	Mean dependent var	1488.290
Adjusted R-squared	0.430018	S.D. dependent var	2316.999
S.E. of regression	1749.268	Akaike info criterion	17.91847
Sum squared resid	79558393	Schwarz criterion	18.14976
Log likelihood	-272.7363	Hannan-Quinn criter.	17.99387
F-statistic	6.658312	Durbin-Watson stat	2.064655
Prob(F-statistic)	0.000790		

Source: Computed by Researcher using E-views version 7

This Table 4 shows that R(-1)= -1.085016, this means that as far as time is concerned, the errors will be corrected at time t. The value of R(-1), this means that, nowadays fiscal policy influence the investment growth in long run. All independents variable (Tax, government debt and foreign capital inflow) are positive correlated to the investment growth. R^2 (0.066016) show the goodness of fit the model. This means that from 2000-2017 fiscal policy has contributed 6% on investment growth of Rwanda.

IVG=0.022778+5.265210 Tax+4.012108Gd +2.516107 FCI -1.066016 (R-1)

The findings of the ECM, which incorporate the effect of fiscal policy and investment rowth, estimated through ECM testing approach. Taxation (5.265210), government debt, (4.012108) and foreign capital inflow (2.516107) have established its positive and statistically significant relationship on investment growth of Rwanda. It shows that fiscal policy stimulates the investment activities and development process in the country to a greater extent, which is obvious from the higher positive value of its coefficient. The positive and statistically significant values of all dependents variables.

In view of goings on the fiscal policy over recent years it might be interesting to inquire whether the behavior of the market (as represented, say, by the Dow–Jones Industrial Average) can be modeled as a case of “long-run equilibrium plus error correction”. What might be a plausible model for long-run equilibrium in this case? Well, corporate stocks ultimately derive their value from the fact that they are claims on the profits made by firms. Thus it seems reasonable to suppose that stock prices should reflect the present discounted value of the future (expected) stream of corporate profit.

7. Conclusion

The increasing of investment growth has reinforced the researcher to study the effect of fiscal policy on investment growth in Rwanda. The effect of independents variables is empirically tested on investment growth as a dependant variable for the period of 2010 to 2017. As such, the results reported the expected positive signs which are statistically significant at some level of significance. The development of fiscal policy is important in sustaining investment growth. The co-integration test illustrates that the variables were co-integrated and implying that a long run relationships exists on the investment growth in Rwanda. Therefore researcher accepts H1#0 and fails to reject H0.

A researcher has faced some limitations during the research process they include the following; the accessibility of second data during the study process, financial constraints and inadequate source of relevant local researchers.

The central hypotheses of the study have been to test how fiscal policy affected investment growth in Rwanda. There is a significant change in investment growth in Rwanda within the study period. The econometric analysis shows that the benefits of fiscal policy are even larger considering that tax; government debt and foreign capital inflow have positive

effects on investment growth. The study confirms the importance of fiscal policy as the most important determinant of investment growth.

8. Recommendations

Based on the results of findings of the study, the following recommendations were made:

1) The findings of this study call for government of Rwanda intervention in three areas: reexamination of government spending to eventually make it complementary to investment growth; channeling more credit to the private sector and designing appropriate policies that deal with the current high domestic public debt.
2) Currently Rwanda has known as hub of technology in East African Region. Government of Rwanda has to use that opportunity to promote investment through, online advertisement like social media, etc.
3) Government of Rwanda have continue to educate the local investors from different sector the importance of promoting local investment like made in Rwanda.

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