AID EFFICIENCY IN THE SOCIO-POLITICAL INSTABILITY CONTEXT OF BURUNDI: A GRANGER CAUSALITY APPROACH

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Abstract

In the last years, Burundi has become increasingly dependent on foreign aid has external investment to its economy, but as this country crossed a crucial periods of civil war, this paper attempts to gauge the determinants of efficiency of aid during the socio-political instability from 1990-2005. The time series data are drawn from various sources. The co-integration approach is applied in this study. From the empirics, it came out clearly that on hand, the foreign aid has an slightly positive effect on economic growth but a highly insignificant on the child mortality rate during this straining civil war; on the hand socio-political stability has a positively significant on child mortality rate but not on economic growth. We recommend that security, good governance and decentralised political governance are the prerequisite for the efficiency of foreign aid.

1. Introduction

The weak growth of savings and the rising imports requirements in the developing countries, especially the Sub-Saharian countries, does not allow these countries to finance their development. Hence, they must resort to the external funding in the form of aid or concessional loans from the institutions of Bretton Woods and other donors because aid transfers can be associated to high growth rates, appropriate wage and exchange rate (Husain, 1993, p. 18, Dalgaard *et al.*, 2003). Among other authors, Burnside and Dollar (1997) reported that the aid to the developing countries can have a positive effect on economic growth and child mortality while Dalgaad *et al.* (2003) pointed out that external aid has a multiplier effect on the productivity of the workers by improvement the education and health quality.

Tough controversies based on the effectiveness of foreign aid on economic development surrounded aid, Burnside and Dollar (2000) and Collier and Dollar (2001, 2002) conveyed that aid works only in places with 'good policies'. In the context of Burundi, despite the country was in socio-political turmoil for a decade, the international community never ceased to assist this 3rd world rank among poorest

countries. For instance, in the 90's, the external aid considerably increased but we observed a downward trend of aid from the onset of civil war in 1993 through 2003. The political stability that followed was characterised by a great flow of aid aiming at assisting this country to shake off its high level of poverty. During this post-war conflict, none has attempted to investigate the impact of financial aid to the development of Burundi. Hence this study is coming up with empirical analysis to fill this gap. Therefore, the objective of this paper is to determine the effects of foreign aid on the economic growth and people health in Burundi.

The theory on the aid is linked to that of economic growth of the developing countries. There are two schools of thought on the effect of aid on the development. The first supports the role of financial aid on the economic development of less developed countries (Harrod-Domar, 1948, Rostow, 1948, Rosenstein-Rodan, 1961, Cheney-Strout, 1960). The other viewed the financial aid of developed countries (DC) to the LCD as the way of sustaining the imperialism in the poorest countries and preferred aid to the trade North-South with a favour to the theories of substitution centred on the law of market and free trade. To understand the causality among determinants of aid in the country shaken by civil war like Burundi for a decade, we applied the Granger causality to time series data on various variables described in the section of methodology. This paper is organised as follows: the methodology of the study articulated mostly on the Granger causality modelling is described next along with the diagnostic test to determine the appropriateness of the data used. The empirical estimates and discussions are presented in section 3 and the conclusions and implications of the results are contained in the last section.

2. Methodology

2.1 Theory on Causality Approach

A number of studies have applied a Granger causality approach in the analysis of the relation of variables in a period of time when the co-integration test failed (Day & Grafton, 2003, Chi-Ok, 2005, Mayer, 2001). This approach has recently received increased attention in the research that attempts to describe short-term relationships among variables under study (Granger, 1969 in Mayer, 2001, Tiffin and Irz,

2006). If a set of F_t has the form $(x_t, z_t, x_{t-1}, z_{t-1},, ..., x_1, z_1)$ where x_t and z_t are vectors and z_t will usually include y_t and z_t may or may not include other variables other than y_t. We say that x_t is Granger causal for y_t. This is a simple linear prediction which can be either bidirectional or unidirectional and it is based on the assumption that while the past can cause/predict the future, the future cannot cause/predict the past (Hamilton, 1994). A prerequisite for Granger causality, however, is that the data series for each variable included in the model be stationary. Running a usually Ordinary Least Square (OLS) regression on non-stationary series may to a spurious regression (Win, 2007). For instance, Halam *et al.* (1994) showed that regressions involving non-stationary variables produce high R^2s and t-ratios that are biased towards rejecting the null hypothesis of no relationship even when there is no relationship between the variables. The time series data under consideration must be not only stationary but also integrated of the same order with similar statistical properties and show evidence of some linear combination of the integrated series. A variable X_t is integrated of order over, i.e., $I(1)$ when it is stationary in level form. As a stationary series, X_t has a mean, variance and autocorrelation that is constant over time. Unfortunately, most economic series tend to exhibit non-stationary stochastic processes of the form,

$$X_t = \alpha_0 + \beta X_{t-1} + \mu_t$$

Where α is a constant drift, $\beta = 1$ and μ_t is an error term. If β is unity and μ_t has zero mean, constant variance and zero covariance, then X_t is a random walk with unit root andis said to be integrated of order $I(1)$. In the case where X_t is non-stationary, the variance may become infinite and any stochastic shock may not return to a proper mean level (Gujarati, 2003, Hendry and Juselius, 1999). A series that is non-stationary requires a single differencing transformation to produce a stationary series. The series X_t is integrated of order DX or $X_t \approx I(D_X)$ if it is differenced D_X times to achieve stationarity. A suitable test for stationarity of individual series has been provided by Engle and Granger (1987) as Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests. We have analysed the values of ADF and PP-stat for the model with constant on one hand and with constant and trend on the other hand. Both the simple D-F and ADF tests were considered as follows:

Table 1: DF simple and ADF tests

DF Simple Test	ADF Test
$X_t = \emptyset X_{t-1} + \varepsilon_t$: Autoregressive model of order 1	$\Delta X_t = aX_{t-1} - \sum_{i=2}^{p} \emptyset i \ \Delta X_{t-i+1} + \varepsilon_t$
$X_t = \emptyset X_{t-1} + \beta + \varepsilon_t$: Autoregressive model with constant	$\Delta X_t = aX_{t-1} - \sum_{i=2}^{p} \emptyset i \ \Delta X_{t-i+1} + c + \varepsilon_t$
$X_t = \emptyset X_{t-1} + b_t + c + \varepsilon_t$: Autoregressive model with trend	$\Delta X_t = aX_{t-1} - \sum_{i=2}^{p} \emptyset \ \Delta X_{t-i+1} + b_t + c + \varepsilon_t$
If null hypothesis, Ho: $\emptyset=1$ is chosen in one of the three models, the process is then non-stationary. Therefore, the stationarity criterion is required in order to get unbiased results.	If null hypothesis, Ho: $\emptyset=1$ is chosen in one of the three models, the process is then non-stationary. Therefore, the stationarity criterion is required in order to get unbiased results.

Source: Authors'work

The ADF is the test done to verify the accuracy of DF simple on the basis of the non correlation of the error term ε_t. The Phillips and Perron test facilitates to take into account the heteroscedastic errors.

In addition to the controversies surrounded the Granger causality, we know that this approach used in this paper may overlook a significant non-linear relation among variables. It will only detect unidirectional Granger causality. Hence, our empirical results and conclusions drawn from them should be considered as suggestive rather than absolute.

2.2 Data Requirements and Estimation Procedure

This study relies on secondary data collected from different sources. The qualitative and quantitative data on economic growth (GDP), child mortality rate and foreign aid are in many reports of BRB ('Banque de la Republique du Burundi'), UNDP, WB, IMF and OECD and ministry of development plan and national reconstruction of Burundi. Socio-political instability has a multidisciplinary dimension. It encompasses the regular change of political leadership by violence or the degree of governance by rule of law. That is what Fosu (1992) called the elite instability which regroups the number of

coup d'états failed or succeeded, political conspiracy, political assassination and arrests and also corruptions of political leaders. We visited governmental and international reports to record 1 if there was any political instability and 0 otherwise, for this type of data was difficult to collect. The indicators of good governance are published by Transparency International since 2005 while others are in the article of Kaufmann and Alii (2006). Alike the socio-political instability indicators, the data on good governance were not available for some period. Hence, the variable was taken as a dichotomous one.

The model chosen in this study, as stipulated by Granger, is one used by Akpo and Alii (2006) derived from the economical analysis of Burnside and Dollar (2000). According to this model, aid has an impact on poverty reduction and economic growth when a number of variables are considered. The model that we are going to use is presented as follows:

$$Iph_{i,t} = \alpha_{i,t} + \beta_1 C_{i,t} + \beta_2 A_{i,t} + \beta_3 \Phi_{i,t} + \beta_4 X_{i,t} + \mu_{i,t}^{iph}$$

$$ypcap_{i,t} = \sigma_{i,t} + \delta_1 A_{i,t} + \delta_2 \theta_{i,t} + \delta_3 X''_{i,t} + \mu_{i,t}^{ypcap}$$

This model explains the relationship between aid and poverty in one hand and aid and economic growth on the other hand. The terms α_i and σ_i are constants terms, β_j and δ_j are the coefficients of the regression undertaking. $Ypcap_{i,t}$ represents the growth of real GDP par capita, $A_{i,t}$ vector representing various decisions taken in regard of aid in the country i and during the period t. $X''_{i,t}$ are exogenous variables that have effects on the growth of GDP. These are, *inter alia,* population growth, socio-political instability, good governance, national expenditures and money supply. θ_{it} explains the interactions between foreign aid and control index of corruption.

The descriptive statistics, non-stationality checking and regression co-integration tests and analysis are done in order to find out the effect of causality among the selected variables on a specific time frame.

3. Results and Discussion

3.1 Descriptive statistics on the variables of the model

The discernment of the variables could be done through descriptive statistics such as mean, maximum, minimum of each variable presented in the following table 2.

Table 2: Descriptive statistics on Variables of the model

Statistics Terms	AID ($ USA)	CPIB	TMI
Moyenne	220949	-0.32	117
Maximum	365000	6.4	118.2
Minimum	87063	-12.6	115.8

Note: **CPIB**: Growth of GDP, **TMI**: Child Mortality Rate

Burundi was granted an average of $ USA 220949 during the period between 1990 and 2005. However, in the same period, the country recorded a negative GDP growth due to the period covering the decade of straining civil war from1993 to 2003. The child mortality rate reached up to 117 deaths for every 1000 births with a range oscillated between 118.2 and 115.8. To capture the results, the following figure was made for this purpose:

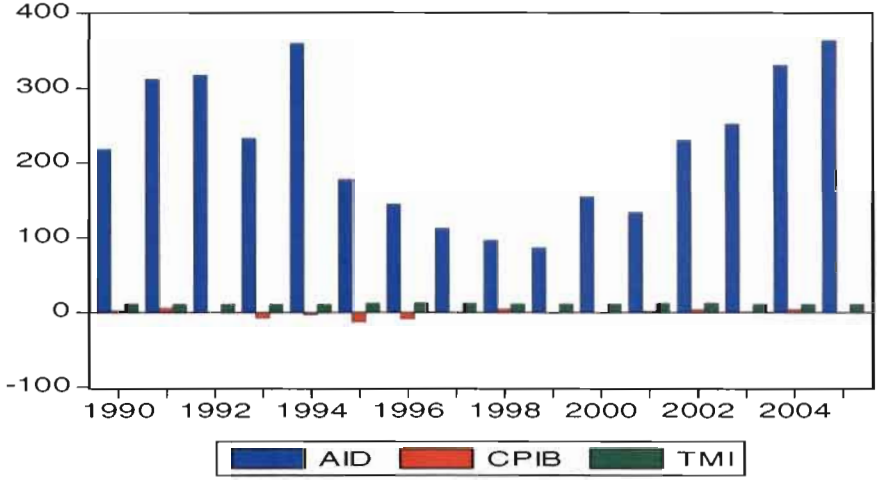

Figure 1: Change of variables on the period of 1990-2005

On this figure 1, except the variable AID, the other variables displayed the same behaviour trend on this period of study: a linear trend. This prompted us to suggest that there is a stationary trend on CPIB and TMI time series data. Therefore, a test on the variable AID to turn it stationary is of a paramount importance.

3.2. Tests of Stationarity on AID Variable

The investigation of the existence of stationarity was carried out on table 3.

Table 3: Results of ADF and PP tests for the variable before First Difference

Séries	AID (+ constant)	AID (+ constant and trend)	stationary
ADF	-2.275348	-1.369434	No
PP	-1.357133	-1.038414	No

We also sought the critical values so that we caught the magnitude of the stationarity.

Table 4: Critical Values of the Variables

ADFc	PPc	ADFt	PPt
V.C à 1% = -4.121990	V.C à 1% = -3.959148	V.C à 1% = -4.992279	V.C à 1% = -4.728363
V.C à 5% = -3.144920	V.C à 5% = -3.081002	V.C à 5% = -3.875302	V.C à 5% = -3.759743
V.C à 10% = -2.71375	V.C à 10% = -2.681330	V.C à 10% = -3.38833	V.C à 10% = -3.324976

We found that the variable AID is not stationary on all level of the tests done. This may be attributed to the political turmoil existing in the country. However, this time series become stationary after differencing as it is shown on the following table of tests on the differencing variable.

Table 5: Results of ADF and PP tests for the variable after First Difference

Séries	AID (+ constant)	AID (+ constant and trend)	stationary	Décision
ADF	-2.004367	-5.625134	Yes	$I(1)$
PP	-4.666296	-5.737859	Yes	$I(1)$

Table 6: Critical Values in First Difference

ADFc	PPc	ADFt	PPt
V.C à 1% = -4.004425	V.C à 1% = -4.004425	V.C à 1% = -5.124875	V.C à 1% = -4.800080
V.C à 5% = -3.098896	V.C à 5% = -3.098896	V.C à 5% = -3.933364	V.C à 5% = -3.791172
V.C à 10% = -2.690439	V.C à 10% = -2.690439	V.C à 10% = -3.420030	V.C à 10% = -3.342253

From the table 6, the results of ADF and Phillips tests showed that the no-stationarity has gone after first difference applied on the time series data. Therefore, we can study the movement of the data in series on a long period. We split our co-integration analysis into two in order to avoid the multicollinearity problem. First we run an analysis on the AID and PIB (i.e. GNP) and second AID and TMI (i.e. child mortality rate). On both analyses, the socio-political instability was taken into account.

Table 7: Results of Model 1

	Coeffic.	Std. Error	t-Statistic	Prob.
C(1)	3.021216	1.825032	-1.655432	0.1237
C(2)	0.018770	0.008194	2.290778	0.0409
C(3)	3.554315	2.354140	1.509815	0.1570
R-squared	0.389616	Mean dependent var		0.640000
Adjusted R-squared	0.287886	S.D. dependent var		5.292151
S.E. of regression	4.465880	Akaike info criterion		6.007666
Sum squared resid	239.3290	Schwarz criterion		6.149276
Log likelihood	42.05750	Durbin-Watson stat		1.361291

Equation of model where dependent variable is CPIB (or GNP growth) and DPS (dummy variable) is socio-political stability variable:

CPIB= -3.021216 +0.018770*AID1+3.554315*DPS

Table 8 : Results of Model 2

	Coeffic	Std. Error	t-Statistic	Prob.
C(1)	12.41876	0.115331	107.6790	0.0000
C(2)	0.001743	0.000964	-1.808323	0.0957
C(3)	0.879444	0.151135	-5.818937	0.0001

R-squared	0.779285	Mean dependent var	11.87413
Adjusted R-squared	0.742499	S.D. dependent var	0.555649
S.E. of regression	0.281962	Akaike info criterion	0.482765
Sum squared resid	0.954028	Schwarz criterion	0.624375
Log likelihood	0.620737	Durbin-Watson stat	1.529622

Equation of the model where TMI (Child mortality rate) is the dependent variable, DPS (dummy variable) is socio-political stability variable:

TMI=12.42 + 0.00174*AID1 + 0.879*DPS

The efficiency of aid on development is not always tangible. The results of the models 1 and 2 show a stubbornly insignificant effect of aid on the development of Burundi. This has been noticed by many authors in other countries of Sub-Sahara Africa. They emphasized that aid alone can spur a sustainable economic growth only if the country has an outstanding macroeconomic performance (Ratha *et al.* 2008, Meir, 1995 in Dalgaard *et al.* 2003). According to Davarajan (2001), out of 10 case studies investigated on when and how foreign aid affected economic policy in Africa, only two (Ghana and Uganda) emerged to be the best in this context. The political instability that characterised Burundi whose civil war has disrupted all economic infrastructures cannot be resolved by the foreign aid. In fact, the only aid that was available in the period considered was to finance the war in some extent because economic embargo imposed on Burundi in 2003 coupled with the quasi-inefficiency of public sector explained the intricacies of the complex aid-growth nexus of Burundi.

On the same period, the return of foreign aid is positive but statistically insignificant ($p>0.05$) on the child mortality rate variable. However, socio-political stability has a highly significant impact of the rate of child mortality ($p<0.001$). An improvement of 1% of this

explanatory variable leads to 0.87% reduction of child mortality rate (proxy to good health). Considering the sluggishly increasing return of aid, we conclude that the aid is not enough to generate an economic growth and the reduction of child mortality rate. Therefore, the hypothesis suggesting that the reduction of aid has a negative repercussion on health and improvement of GDP remains true for Burundi. We here put forward that the combination of socio-political stability and aid has multiplier effect on the economic growth and health of people. This leads to confirm our hypothesis that the insecurity of Burundi during civil war has hindered the efficiency of aid. The significant of socio-political stability revealed to us the opportunity cost that Burundi would get during the turmoil period (1990-2005). All action and policy aiming at improvement the economic face of the country must stress on the dimension of two variables (aid and socio-political stability) altogether.

4. Conclusion and Recommendations

The analyses on the impact of aid on the economics and welfare in developing countries have been ambiguous. In the present study, we found that Burundi has benefited a financial support from the international cooperation during the period under study. The aid grated to county fluctuated so much because of the international shocks and national crisis endured from 1993 to 2003. The results found in this paper revealed us that the aid received by Burundi did not have a significant impact on the economic growth and child health. However, one cannot neglect the slightly positive impact on the development of this country. On the economic growth, we can comprehend the results in the angle of most that the aid was in the form of food and humanitarian aids during the crisis. The impact could be great if the assistance could be channelled towards the production sector. Besides, the aspect of socio-political stability emerged to be the most important factor of development and is indeed the foundation of the efficiency of aid. In fact, the execution and evaluation/monitoring of many programmes of development require a period of peace and security (Amprou and Chauvet, 2004). From these, we put forward the following recommendation on the betterment of efficiency of aid: decentralised governance, good governance to be checked out and monitored regularly and efficient reforms on the aid allocation.

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