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Does Aid Undermine The Mobilization Of Domestic Resources?

Jean Marie W. Kébré[1], Idrissa M. Ouédraogo [2]
[1](*Ministry of Economy, Finance and Development, Burkina Faso*)
[2](*Department of Economy/ University Ouaga II, Burkina Faso)*
**Corresponding Author:Jean Marie W. Kébré[1]*

ABSTRACT*: This article analyzes the relationship between aid and the mobilization of domestic public resources. The aim is to assess whether aid incites recipient countries to reduce the mobilization of tax revenues and domestic borrowing; in other words, is there a crowding out effect of public resources by aid. The analysis uses panel data from 45 sub-Saharan African countries that were aid recipients over the period of 1970 to 2014. The results of the estimates suggest that aid discourages the mobilization of fiscal resources in these countries but encourages the use of domestic borrowing to finance public budgets.*

KEYWORDS -*Aid, Domestic borrowing, Domestic resources, Net government claims,Tax revenues.*

I. INTRODUCTION

One of the economic consequences of an increase in external resources for developing countries discussed in the economic literature is the impact it may have on the ability of these countries to mobilize domestic resources to finance their investments. Indeed, general findings in the empirical economic literature show that increasing the level of domestic revenue as a share of GDP is a long and difficult endeavor [1]and this difficulty is more pronounced in assisted countries. Increased aid can be fully offset by lower revenues if these countries suffer from high levels of corruption or institutional weaknesses[2], [3],[4].

By considering external assistance as a substitute for domestic revenue, recipient countries run the risk that a significant expansion of this aid hinders the mobilization of domestic revenues, including a weakening of tax collection efforts. Low revenue mobilization could result from poor fiscal civism or unnecessary tax exemptions from policy makers and, in turn, create dependency on aid. In addition, the reduction of the tax burden can have an adverse effect on the country's institutions: when they pay less tax, citizens are less likely to demand accountability from the state [1].

In the presence of such risks, any scenario of aid expansion must take into account the possible effects of aid on revenue. A set of accompanying measures must be put in place, with a focus on the need to maintain or reinforce revenues during the period of increased aid, both to protect against the vagaries of donor behavior and to prepare for a possible gradual decrease in aid flows.

It is in this sense that some donors such as the international financial institutions (World Bank, IMF, African Development Bank, etc.) accompany reform programs in developing countries by providing financial support to the State Budget provided that macroeconomic and/or sectoral reforms are implemented in these countries. Support channeled into these programs aims to promote governance in multiple ways with the expected results of aid producing positive change leading to good governance [5], [6], [7].

The Bretton Woods Institutions have made public finance management reform one of the cardinal principles of their interventions. Their aid includes accompanying policies that require recipient countries to make greater efforts to mobilize domestic resources, especially those in which the tax burden is below the 15% threshold [3]. The idea is that by replacing internal resources taken from national economic actors, external aid does not compromise the principles it claims to promote, namely ownership, accountability, and citizen participation [8], [9].

Despite this precaution, the economic literature on aid dependency warns of the risk of deterioration in the domestic resource mobilization effort of countries receiving large flows of aid [2], [3], [4]. This caveat is all the more important since public tax levies are a reliable indicator of the institutional capacity of a government. Indeed,[10] justified that the system of collection of the tax of a country is revealing of the quality of its institutions. Other authors argue that the ability of a state to raise taxes is one of the key determinants of establishing credible institutions and creating a relationship of accountability between the state and its citizens [8], [9], [11], [12]. In this sense, if public resources come mainly from donors and if the government is primarily accountable to these aid agencies, it seems difficult to consider the development of a social contract between the State and its citizens.

The purpose of this paper is to analyze the relationship between aid and the mobilization of domestic resources. The question is whether aid encourages the receiving countries to reduce the mobilization of domestic resources; is there a crowding out effect of public domestic resources by aid? The paper is organized as follows. Section 2 provides a review of relevant literature about aid effects on domestic resource mobilization. The third section presents the model and the estimation technique and the fourth section analyzes the results. Section 5 concludes the paper.

II. EFFECTS OF AID ON THE MOBILIZATION OF INTERNAL RESOURCES IN THE LITERATURE

2.1. Complementarily and crowding out effects

The effects of aid on domestic resources depend heavily on the behavior of states in the face of aid. In the literature, two theoretical models offer an analysis of the mechanisms illustrating why the level of taxation is likely to vary as aid increases: the model of [4] and that of [13].

For [4], government behavior resulted from maximizing a utility function that determines the optimal use of aid from the government's point of view. In this model, an increase in aid corresponds to additional resources that the government uses to increase its spending and/or reduce its level of taxation. The result of this arbitration is determined by an optimization process: the government varies all the aggregates so as to minimize the cost of deviations from the target values it has set.

As for [13], they proposed another model of budgetary behavior of a "patrimonial" government. This government is essentially seeking to use its sovereign power to transfer resources to its political base. According to this model, a government with a broad political base will take advantage of aid to lower its level of taxation so as to increase the income of the favored group (and, therefore, of the entire population). When the political base is reduced, the tax rate will remain unchanged and all aid will be transferred to the favored small group.

Starting from these models of budget responses, empirical applications have explored the question of the impact of an increase in aid on the total level of government revenue. The conclusions of these empirical investigations revolve around two axes.

The first axis groups authors who believe that the increase in aid can increase tax levels[14], [15]. Additional aid flows aim to increase the level of spending in the priority sectors. In no case should they be used as a substitute for existing sources of funding. Aid flows must, therefore, be conditioned on the recipient countries' commitment not to diminish their efforts to mobilize tax revenue. Khan and Hoshino (1992) [16], in their study of determinants of the tax rate, incorporated aid variables and showed a positive impact of external loans on the tax rate. Cashel-Cordo and Craig (1990) [17] also noted a positive impact of loans from development banks to African countries on levy rate. However, the drawback of these results is that the loans included in the models for estimations correspond to total external loans. This contains non-concessional public loans and private loans, making it difficult to interpret the results[2]. This is why [18]focused their analysis on IMF assistance programs for developing countries through a dynamic panel estimate of 99 countries over the period from 1984 to 2004. They concluded that these programs have a positive impact on the tax effort.

The second axis considers that aid transiting through the state budget creates a problem of incentives for the government in terms of taxation. In the absence of aid, a government seeks a political balance between the unpopularity of taxes and the popularity of public spending[19], [20]. The receipt of external assistance does not call into question the need to find this point of balance but modifies the levels of taxation and expenditure at which this equilibrium is reached. By loosening the government's budget constraint, aid allows the government both to maintain a high level of public spending and to reduce taxes[21]. Ghura(1998) [22], in his study of 39 sub-Saharan African countries during the period from 1985 to 1996, highlighted the negative impact of donations on the public levy rate in developing countries. Gupta and al. (2003) [23] reached the same conclusion by integrating the overall aid, and [24]analyzed the relationship between aid flows and public finance aggregates using panel data from aid recipient countries over the period of 1980 to 2000. He concluded that the aid has no significant influence on the tax collection effort but acts as a substitute for government borrowing.

These results are, however, very weak in the eyes of some authors. Morrisey and al. (2006)[25], attempting to replicate the results of [23], observed that aid variables all become insignificant when lagged. They concluded that one must be cautious when interpreting the results of the study of [23], as there is evidence that the composition of the aid has a causal effect on the levy rate. Moss, Peterson and van de Walle(2006) [9] and [14]also pointed out that the literature does not allow a sound judgment on the existence of an eviction effect.

2.2. **Effects of the quality of governance on aid**

The need to fund additional services is not the only justification for maintaining tax levels in the event of an increase in development assistance. As already pointed out above, the ability of a state to collect taxes is one of the essential determinants of establishing credible institutions and creating a relationship of

accountability between the state and citizens [11], [12], [8], [9]. The aid is likely to have indirect effects on the mobilization of public revenue by affecting the institutions of the recipient country.

Azam and al. (1999)[11] showed that the negative impact of aid on government revenue can be accentuated or reduced by the quality of institutions. A country with initially weak institutions - and thus a reduced capacity to collect tax revenue - would have a stronger incentive to reduce its fiscal effort in response to increased aid. They logically concluded that there may be some heterogeneity in the relationship between tax revenues and aid depending on the quality of governance.

Starting from the conclusion of the previous authors, [3]sought to identify heterogeneity in the relationship between tax revenues and aid based on the quality of governance. The previous authors' introduction of the corruption variable in an additive way in the levy rate equation does not allow testing of the supposed interaction between institutions and aid. To improve the method, Gupta and al. (2003) provided sub-sample estimate by level of corruption. The first group includes the countries classified as the most corrupt (37 countries in the total sample) and the second sub-sample is made up of the least corrupt countries (18 countries).

The results showed a negative impact of donations on the levy rate but it decreased according to the level of donations. They were close to the results obtained with the complete sample; however, they pointed out that in countries with weak institutions, the magnitude of the negative effect of donations is significantly higher than in the total sample. As for the regression relative to half of the most corrupt countries, the positive impact of loans is decreasing with the level of loans granted (while the impact was constant on the total sample); this positive impact is no longer significant in the regression the other subsample.

Certainly, the results of [3]are quite interesting, but [2]stated two criticisms. On the one hand, they believed that there is no evidence that the negative effect of donations is significantly higher in countries with weaker institutions since sub-sample estimation does not allow testing of the significance of the difference between the coefficients associated with the donations estimated in the two regressions. On the other hand, the mechanisms by which institutions modify the impact of aid are not precisely identified since only the corruption variable is retained in the estimates, while other relevant variables exist (quality bureaucracy or governance).

In relation to these criticisms, [2], in their estimates, proposed two improvements to test the hypothesis of interactions between aid and institutions. On the one hand, they introduced the corruption variable multiplicatively with the help variables in a regression performed on the full sample. On the other hand, they used institutional alternatives to corruption such as bureaucracy and democratic control in order to pinpoint institutional gaps that weaken the impact of aid. The results identify a positive impact of the aid on the tax effort, which does not seem to be different for loans and grants. This positive impact of aid depends on the quality of the administration of the recipient country. While aid has a positive impact on countries with quality institutions, this impact is zero-even negative-for countries with the weakest institutions.

However, [26]found that aid does not have enough power to affect institutions; rather, it amplifies existing institutional structures by strengthening countries on the path they have already chosen: the amplifier effect.

III. MODELS AND ESTIMATION STRATEGY

Based on the economic literature, this study assumes that the aid weakens the capacity for tax mobilization and domestic public borrowing of aid recipient countries. It can also be assumed that the relationship between the volume of aid and the capacity to mobilize internal public resources is non-linear. This non-linearity is observed not only in the quality of the institutions of the beneficiary countries as channels of transmission of the effects of the aid but also in the presence of decreasing marginal returns of the aid.

a. The Models

For the analysis of the effects of aid on the mobilization of public resources, this paper draws on the Gang and Khan (1991) model used to analyze the relationship between foreign aid and the fiscal behavior of the Indian government. This model was picked up and improved upon by [28]and by [24]for the same topic but in developing countries receiving aid. Starting from the budget model developed by [4], their model identifies equations derived from an objective function of government that presents as follows:

$$U = f(I_g\ , G, T, A, B), \qquad (1)$$

with I_g standing for public investment, G for public consumption, T for the level of taxation, A for foreign aid, and B for domestic borrowing. It is assumed that the government minimizes the following quadratic loss function:

$$U = \propto_0 - \frac{\propto_1}{2}\left(I_g - I_g^*\right)^2 - \frac{\propto_2}{2}(G - G^*)^2 - \frac{\propto_3}{2}(T - T^*)^2 - \frac{\propto_4}{2}(B - B^*)^2, \qquad (2)$$

where the variables in "asterisk" indicate the targets and the$\propto_i \geq 0$ represent the weights attached to each element of the utility function. This function is specified so that any government decision to deviate from targets is felt as a loss of utility. In other words, when a government deviates from the policy it wishes to implement, it

bears a cost; this cost constitutes for this government an incentive not to allow the level of aggregates to deviate from their target value. It is also assumed that public policy makers make decisions under budgetary constraints:

$$I_g + G = T + A + B \quad (3)$$

This constraint requires that public spending be equals to public resources. In other words, it is assumed that the government is working with a balanced budget.

The Lagrangian is used to solve this maximization program, as follows:

$$L = \propto_0 - \frac{\propto_1}{2}\left(I_g - I_g^*\right)^2 - \frac{\propto_2}{2}(G - G^*)^2 - \frac{\propto_3}{2}(T - T^*)^2 - \frac{\propto_4}{2}(B - B^*)^2 + \lambda\left(I_g - G - T - A - B\right), \quad (4)$$

whereλ is the Lagrange multiplier.

From equation (4), one can derive the first-order conditions. Resolution of these conditions (arrangements and substitutions) leads to the following structural equations:

$$I_g = \delta_1 I_g^* + \delta_2(A + B^* + T^* - G^*), \quad (5)$$

$$G = \delta_3 G^* + \delta_4\left(A + B^* + T^* - I_g^*\right), \quad (6)$$

$$T = \delta_5 T^* + \delta_6\left(A + B^* + I_g^* - G^*\right), \quad (7)$$

$$B = \delta_7 B^* + \delta_8\left(A + T^* + I_g^* - G^*\right), \quad (8)$$

where the $\delta_j\,(j = 1,2,\ldots,8)$ are combinations of $\propto_i\,(i = 1,\ldots,4)$. The problem encountered by most studies dealing with the tax response to aid is obtaining the target variables included in the model. These targets exist in some cases only for short periods. To overcome this obstacle, target values are usually estimated through ordinary least squares or cointegration techniques. But rather than determining these values by estimation techniques, some authors like Ouattara(2006) have tried to approximate them by the following economic relations:

- ✓ $I_g^* = \gamma_0 + \gamma_1 Y + \gamma_2 D + \gamma_3 A,$
- ✓ $G^* = \eta_0 + \eta_1 Y + \eta_2 D + \eta_3 A,$
- ✓ $T^* = \mu_0 + \mu_1 Y + \mu_2 X + \mu_3 M,$
- ✓ $B^* = \varepsilon_0 + \varepsilon_1 Y + \varepsilon_2 A,$

where Y stands for per capita GDP, D is the debt service, A represents the disbursements of aid, and X and M stand for exports and imports, respectively.

In this paper, we are interested in analyzing the relationship between aid and the mobilization of internal resources. To this end, by introducing the approximated targets in equations (7) and (8), we obtain the following equations:

$$T = \pi_0 + \pi_1 Y + \pi_2 D + \pi_3 A + \pi_3 X + \pi_3 M, \quad (9)$$

$$B = \rho_0 + \rho_1 Y + \rho_2 D + \rho_3 A + \rho_3 X + \rho_3 M. \quad (10)$$

i. Variables affecting the tax levy

Starting from equation (9), the concept of fiscal effort is introduced to assess the extent to which countries exploit their revenue potential: as a distinction between the share of public resources determined by structural factors and public resources determined by economic policy and the action of the State, in general [2]. According to them, the tax rate of an economy is determined both by the fiscal potential of the economy and by the tax effort, which can be defined additively in relation to the tax potential.

The tax potential is determined by a set of structural variables. This is the level of public levy that can be anticipated given the structural factors specific to a country or group of countries [12]:

- the level of development is approximated by two variables: the gross domestic product per capita and the sectoral origin of income measured by the share of agricultural value added [12],[29]. These variables are expected to have a positive effect on the public levy. However, a negative relationship could also be envisaged for the contribution of agricultural activities to GDP since the agricultural sector is difficult to impose due to the predominance of subsistence activities and units of production that are often dispersed and have a low level of unit production.[12], [29]. The costs of implementing and controlling a tax on these activities would be very high and the expected gains low [22]. Some studies also introduce human development variables such as the human development index, enrollment rate, and infant mortality rate[16],[17]. These variables are expected to have a positive effect on the tax levy.
- trade openness approximated by the rate of trade openness and the degree of monetarization of the economy measured by the ratio of the money supply (M2) to GDP. Trade with the outside world is a more taxable base than economic transactions (income or domestic consumption) that do not give rise to a monetary exchange [22], [29]. The positive effect of openness and the degree of monetarization is reinforced for some countries by a high share of mining and oil products in total exports because this category of exports can give rise to substantial levies in the form of taxes or royalties.

The fiscal effort depends on the tax mobilization policy put in place by the government. Beyond the structural variables, three categories of variables influence the tax effort:

- Macroeconomic policy variables. Based on the economic literature, debt service, inflation, and the real exchange rate can be taken as policy variables [16],[2],[22],[30]. To these variables, one can add the financial cooperation policy (or aid policy) that affects the level of public revenue because of the ability of aid to behave as a substitute for other forms of financing [23],[24]. Contrary to the negative effect of inflation, it is expected that debt service and the real exchange rate will positively influence the tax levy.
- institutional variables. The institutions that directly determine the level of public levy are, of course, the tax and customs administrations. The quality of public service at these levels is crucial because it directly affects the tax levy [2],[24],[30]. In addition, the functioning of tax administrations is affected by other elements of the institutional context (corruption, respect for property rights and contracts, justice, political instability, etc.). The most direct impact of corruption, for example, is the diversion by tax collectors of the proceeds of such taxes or the facilitation of tax evasion in return for bribes [2],[31].
- Interaction between aid and institutions. The concern over the relationship between tax revenues and aid, depending on the quality of governance, must be addressed [11],[23]. According to these authors, the introduction of the corruption variable additively in the sampling rate equation does not allow to test the supposed interaction between the institutions and the aid. This is why studies testing this interaction hypothesis introduce the institutional variable in a multiplicative manner with the aid variable in the regression of the tax levy model [2],[5], [18]. It is expected that this interaction variable will have a negative influence on the tax levy due to weak institutional quality in African countries.

ii. Variables affecting domestic borrowing

From the point of view of its fiscal constraint, when aid flows increase, the government can maintain or change the level of domestic borrowing[32]. The maintenance of the level of domestic borrowing would result from a situation where the increase in aid is greater than the consequent increase in expenditure, and the increase in expenditure is greater than that of the aid but where the government is increasing revenues [32]. The effect of the aid is to reduce domestic borrowing as the government increases its deposits with the banking system to free resources for the private sector. In the absence of the variable that directly provides domestic government borrowing, its evolution may be approximated through net claims on the government (also called the government's net position) in the monetary position of the macroeconomic accounts. Net claims on the government only capture the portion of the borrowings from the banking system, but they are the main source of domestic borrowing for which information is available. An increase in these debts is indicative of an increase in the State's commitment to the banking system (public borrowing from the banking system).

In the same logic as at the level of the tax levy, equation (10) makes it possible to assess the effects of the aid on domestic borrowing. A priori, the same categories of variables determine domestic borrowing, which is grouped into structural factors, macroeconomic policy variables, and institutional variables, with some differences:

- the structural factors are GDP per capita, domestic savings rate, investment rate, and financial sector deepening generally measured by money supply (M2) or credit to the economy as a percentage of GDP [33], [34], [35], [36]. As an indicator of financing constraints of the economy, the financial sector deepening is also an important determinant of government borrowing. These variables are expected to positively affect public domestic borrowing.
- macroeconomic policy variables are budget deficit, debt service, tax rate, economic openness, interest rate, and aid flows [16], [18], [22], [30]. The fiscal deficit, debt service, interest rate, and aid flows are expected to negatively affect the level of domestic public borrowing. On the other hand, the tax rate and economic openness should have a positive effect on these loans.

b. Estimation strategy

Several methods can be used to estimate equations (9 and 10). The fixed effects and random effects model can be used; however, this technique does not evaluate estimators in the presence of a high risk of endogeneity. Yet, there is a significant risk that aid will be endogenous if donors determine their aid amount by responding to recipient countries' public finance problems, particularly a decline in government revenue (reverse causality). It may also be that aid is higher for countries with higher needs (social sectors) and, for the same reasons, these countries have greater difficulty in collecting domestic resources[2].

Several studies have taken into account the problem of endogeneity of the aid variable in the sampling and borrowing equations [2], [18], [23], [24]. Gupta and al. (2003)[23] proposed two ways to deal with this problem. First, they performed regressions using lagged variables of aid instead of level variables and indicated that the results are not significantly modified. Then, regressions using the lagged variables along with population and income variables were conducted, and the results are considered similar to the baseline regressions. As for[24], he made his estimates using the GMM-system method, which makes it possible to take into account all sources of bias caused by the problem of endogeneity by exploiting the independent variables

with their lagged differences and their lagged levels. Finally, [2], [18] used instruments that capture variations in aid that are linked to external factors (and are, therefore, exogenous). This type of instrument has been proposed by [37] who constructed exogenous variations in aid for a recipient country from variations in the overall aid of different donors by weighting them in a specific way for each country according to the country's proximity with donors.

For this study, we will use the GMM-system method. The interest in this method lies in its ability to provide solutions to the problems of simultaneity bias, reverse causality, and omitted variables. For both models, we used a GMM dynamic panel system. Data come from the World Bank database and covers 45 countries in sub-Saharan Africa over the period from 1970 to 2014.

IV. RESULTS

a. Descriptive Statistics

In order to better appreciate the behavior of internal public resources in the context of aid, the examination of some descriptive statistics on some of the variables is necessary. For this purpose, Table 1 below summarizes statistics on aid, tax revenue, and claims on government.

In general, for sub-Saharan Africa, the assistance received by the 45 countries in the sample is estimated, on average over the period of 1970 to 2014, at US$52.58 per inhabitant. Although the statistics suggest a convergence between the different sub-groups of interests (language, monetary, and economic zone), there are still some specificities that characterize particular areas. It is noted that Portuguese-speaking countries received the most aid (US$136.76 per capita) followed by French-speaking countries with an average of US$49.75 per inhabitant, and English-speaking countries have benefited the least (US$39.88). The Economic Community of West African States (ECOWAS) zone benefited over the period from an estimated aid of US$55.71 on average per inhabitant.

Regarding tax revenues, statistics reveal that, on average, they represent 14.91% of the GDP of Sub-Saharan Africa countries. We are tempted by these statistics to say that the level of fiscal burden is low, especially if we take into account some regional and international guidelines that set a specific threshold. Admittedly, from the economic point of view, the importance of the tax burden can pose a problem with the effectiveness of fiscal policy – too much tax pressure is not recommended. Apart from the disincentives to private initiative of a strong levy and the negative psychological aspects of a system that is often perceived as bureaucratic and complex, it must be emphasized that too much tax kills taxes and that an excessive tax burden tends to promote fraud and concealment. Nevertheless, it should be noted that the level of the tax burden as described in the statistics is quite low. In the countries of the Future Climate for Africa (FCFA) zone and those of ECOWAS, the level of tax revenues is between 11.37% and 12.77% of GDP, whereas a number of these countries belong to the West African Economic Monetary Union (WAEMU) economic zone. In this area, one of the convergence criteria is related to the revenue level, which is recommended to be 17% of GDP.

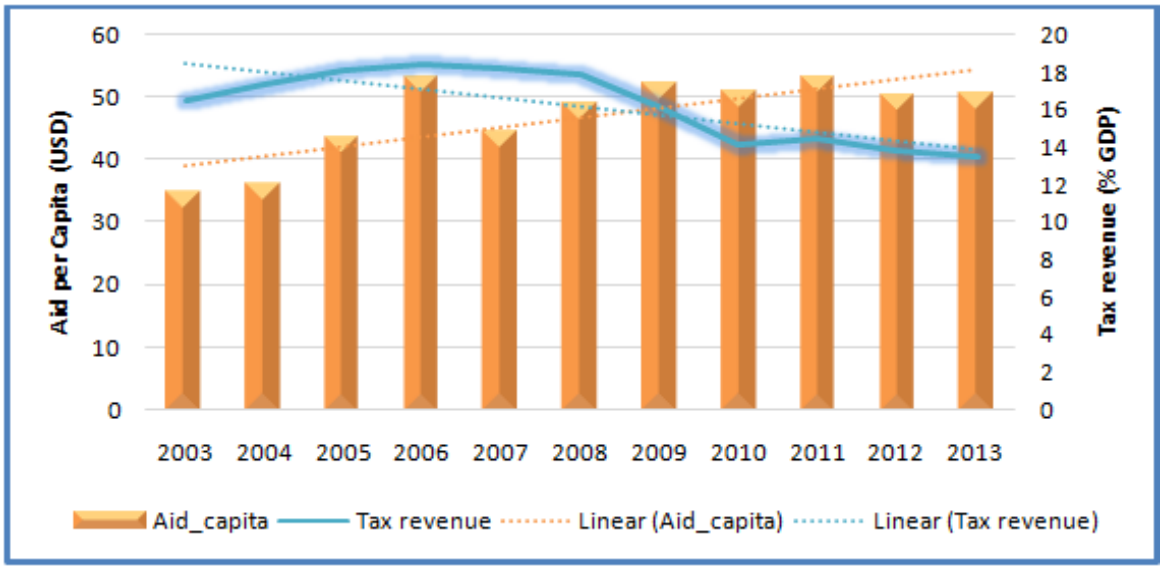
Claims on government stand at 23.62% of GDP, on average, over the period. The ECOWAS zone seems to have the most recourse to mobilizing the resources of the domestic banking system to finance the public budget (55.37%). However, the cross-analysis with the statistics of the Francophone countries and the FCFA zone suggests that it is because the governments of the Anglophone countries of the ECOWAS zone use the banking system the most to finance their budget. Table 1 provides details of the statistics for the different areas of the sample.

Table 1: Descriptive statistics of variables by zone over the period from 1970 to 2014

	Number of Countries	Per capita aid	Revenue (% GDP)	Receivables (%PIB)
Sub-Saharan Africa	45	52,58	14,91	23,62
English speaking country	21	39,88	16,16	45,58
French-speaking country	20	49,75	12,79	4,53
Lusophone country	4	136,76	19,10	5,29
CFA zone	16	42,93	11,37	4,17
Non CFA zone	29	57,95	16,83	35,07
ECOWAS zone	15	55,71	12,77	55,37
Other Zone	30	51,02	15,97	6,83

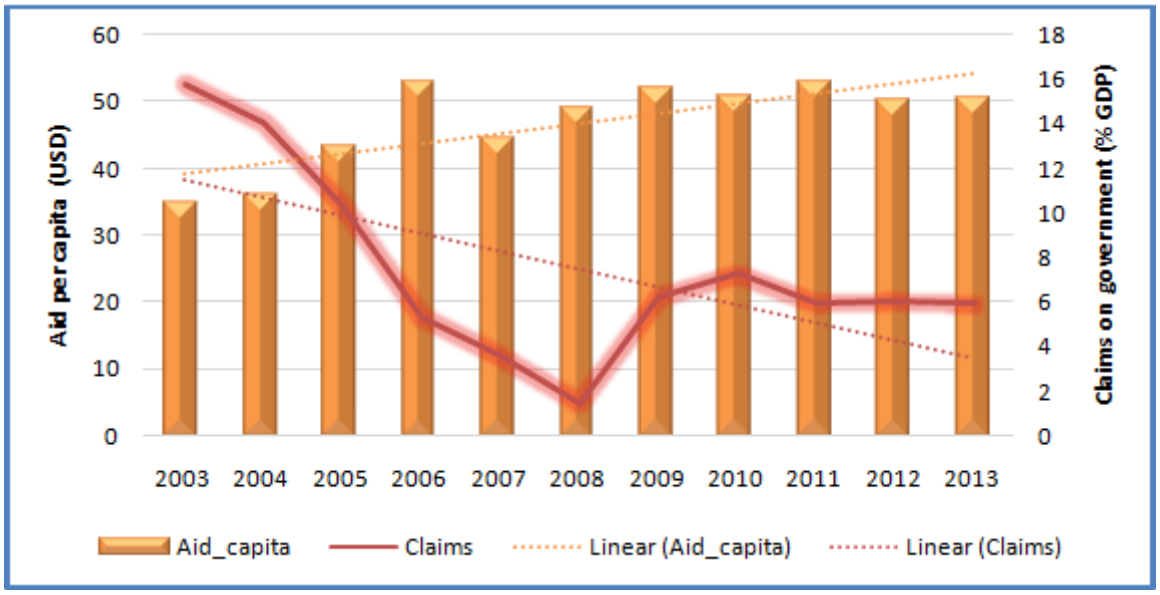
Source: Authors from World Bank Data

Fig. 1 and 2 provide information on the evolution of aid, tax revenues, and government receivables, with Fig. 1 suggesting an eviction of tax revenues by aid. Indeed, while the evolution of aid per capita shows a growing trend over the period of 2003 to 2013, tax revenues reveal a downward trend. In Fig. 2, the same type of relationship is observed. While the evolution of aid per capita displays a growing trend over the period, claims on the government show a general downward trend. Thus, the analysis of the evolution of these different variables provides a signal of the existence of an eviction relation between aid and tax revenues on the one hand and between aid and receivables of the government on the other hand. The presumption on the type of relationship will be further analyzed through the econometric estimates in the next section.



Source: Authors from World Bank Data

Fig. 1: Evolution of aid (per capita) and tax revenue (% GDP) in Sub-Saharan African countries (2003-2013)



Source: Authors from World Bank Data

Fig. 2: Evolution of aid (per capita) and claims on government (% GDP) in Sub-Saharan African countries from 2003 to 2013

b. Econometric estimates

Tables 2 and 3 present the results of estimates of tax revenue and domestic borrowing models. The estimates are generally satisfactory and the results are robust. Indeed, the diagnostic statistics are favorable in

the sense that Hansen's over-identification test does not reject the validity of the instruments used, and the Arellano and Bond test does not reject autocorrelation at order 2.

The results of the tax revenue model (Table 2) allow the testing of the eviction and non-linearity between aid and tax revenue hypothesis. Those provided by the estimate (I) show that the aid is negatively linked to tax revenue, thereby confirming the existence of an eviction relationship between aid and tax revenue. These results suggest that, in the sub-Saharan African countries in the sample, an increase in aid is an additional resource that governments use to reduce tax levels. The results converge toward the conclusions reached by[22],[23],[21] which showed that, by loosening the government's budget constraint, aid helps both to maintain a high level of public spending and to reduce tax levies. This reduction in tax levels can be manifested through the reduction of the levy effort or the increase of tax evasion resulting from corruption.

The results of estimates II to V test the hypothesis of a non-linear relationship between aid and tax revenues. Those in the estimate II show that there is no significant relationship between aid and tax revenues. The anticipated threshold effect cannot, therefore, be confirmed. On the other hand, the results of estimates III to V that cross the aid with governance variables indicate that only the variable where aid is crossed with corruption is significant, having a positive effect on tax revenues. These results suggest that controlling corruption is a good channel for aid to have a positive effect on tax revenue mobilization. Thus, the negative effect of aid on tax revenues is reversed if the governments of the sample countries exercise good control over corruption. These results are consistent with the findings of[23]and[2] for whom the quality of institutions is essential for aid to positively affect the level of tax revenue mobilization.

Table 2: Results of the Tax Revenue Model

	(I)	(II)	(III)	(IV)	(V)
Revenue (-1)	0,846*** (76,07)	0,846*** (76,07)	0,810*** (52,02)	0,812*** (52,29)	0,811*** (52,06)
Aid	-0,007** (-2,53)	-0,008 (-1,52)	-0,071*** (-3,62)	-0,045* (-1,65)	-0,056** (-2,56)
Aid__Squared		$1,37e^{-05}$ (0,27)			
Aid_corrupt			0,017* (1,95)		
Aid_fic_pol				0,007 (0,95)	
Aid_quality					0,013 (1,57)
GDP_cap	$4,20e^{-05}$ (1,52)	$3,98e^{-05}$ (1,39)	$4,05e^{-05}$ (1,20)	$4,19e^{-05}$ (1,25)	$4,78e^{-05}$ (1,42)
schooling	0,009*** (5,93)	0,009*** (5,94)	0,013*** (4,73)	0,013*** (4,82)	0,014*** (4,90)
Openness	0,006*** (6,57)	0,006*** (6,58)	0,008*** (6,00)	0,008*** (6,10)	0,009*** (6,21)
Money	$-1,89e^{-05}$ (-0,38)	$-1,86e^{-05}$ (-0,37)	$1,90e^{-06}$ (0,03)	$3,19e^{-06}$ (0,03)	$4,12e^{-06}$ (0,07)
Debt_Service	0,011*** (3,61)	0,011*** (3,61)	0,019*** (3,79)	0,020*** (3,89)	0,020*** (3,95)
GDP_Deflator	-0,0001** (-2,47)	-0,0001** (-2,48)	-0,0014** (-2,89)	-0,0014** (-2,82)	-0,0014** (-2,78)
AR1 Test: P-value	0,0143	0,0142	0,046	0,0468	0,0464
AR2 Test: P-	0,2058	0,2058	0,2494	0,2501	0,249

value					
Number of countries	45	45	44	44	44
Number of observations	1404	1404	670	670	670

Note:
- ✓ (I) and (II): aid and squared aid are alternately introduced in the model for estimation.
- ✓ (III), (IV) and (V): aid is alternately crossed with governance variables such as corruption, tax policy, and the quality of tax administration.
- ✓ ***, **, * denote levels of significance at 1%, 5% and 10%, respectively.

The results of the domestic borrowing model (Table 3) also allow testing of the hypothesis eviction and non-linearity between aid and public domestic borrowing (captured by government net claims). They show that aid has a positive influence on government net claims (estimate I). To better interpret these results, it is important to remember that, by convention, a government net creditor position is preceded by the minus sign while a net liability position is preceded by a plus sign. Taking this into account, the results suggest that an increase in aid allows the banking system to increase net credit to the government. They, therefore, suggest that, unlike tax revenues, aid encourages the banking system to better support government budget funding. This effect of a government's net claims on aid could be explained by the behavior of tax revenues in the face of aid. Indeed, governments concerned with maintaining their electorate seem more inclined to use domestic borrowing to cover expenses rather than increase tax revenues.

As for the nonlinearity test, only the introduction of the quadratic variable of aid in the model (estimate II) provides significant results. Indeed, we note a change of sign of the quadratic variable, suggesting a decrease of the positive effect depending on the level of aid. The results of introducing the governance variables crossed with aid are not significant.

Table 3: Results of the domestic borrowing model

Variables	(I)	(II)	(III)	(IV)	(V)
Claims (-1)	0,856*** (57,88)	0,849*** (56,83)	0,519*** (21,43)	0,520*** (21,46)	0,519*** (21,42)
Aid	1,829*** (5,52)	2,155*** (6,16)	0,912 (0,31)	-0,305 (-0,09)	0,027 (0,01)
Aid_squared		-0,0006*** (-2,79)			
Aid_corrupt			-0,538 (-0,53)		
Aid_fic_pol				-0,085 (-0,08)	
Aid_quality					-0,137 (-0,24)
GDP_capita	-0,003 (-0,94)	-0,002 (-0,57)	-0,0002 (-0,04)	-0,0002 (-0,06)	-0,0003 (-0,07)
Private_credit	1,532*** (3,32)	1,780*** (3,80)	1,506** (2,43)	1,452** (2,38)	1,468** (2,39)
Investment	0,630 (1,53)	0,612 (1,49)	-0,688 (-1,12)	-0,690 (-1,117)	-0,669 (-1,07)
Interest_rate	-0,127 (-0,80)	-0,142 (-0,90)	0,077 (0,36)	0,082 (0,38)	0,083 (0,39)

Tax_rev	-1,544* (-1,86)	-1,532* (-1,34)	-0,283 (-0,19)	-0,361 (-0,25)	-0,368 (-0,25)
Debt_serv	-0,306 (-1,19)	-0,342 (-1,34)	0,068 (0,16)	0,039 (0,09)	0,042 (0,10)
Export	0,397 (1,10)	0,437 (1,21)	-0,366 (-0,70)	-0,386 (-0,74)	-0,386 (-0,75)
Import	-0,408* (-1,74)	-0,380 (-1,62)	0,564* (1,70)	0,555 (1,66)	0,545 (1,62)
AR1 Test: P-value	0,0015	0,002	0,0035	0,0035	0,0034
AR2 Test: P-value	0,5971	0,652	0,9141	0,911	0,9076
Number of countries	45	45	45	45	45
Number of observations	1370	1370	626	626	626

Note :

- ✓ (I) and (II): aid and squared aid are alternately introduced in the model for estimations.
- ✓ (III), (IV), and (V): aid is alternately crossed with governance variables such as corruption, tax policy, and the quality of tax administration.
- ✓ ***, **, * denote levels of significance at 1%, 5% and 10%, respectively.

V. CONCLUSION

This article focuses on the analysis of the relationship between aid and revenue mobilization and between aid and public domestic borrowing. The analysis used panel data from 45 sub-Saharan African countries that benefited from aid over the period of 1970 to 2014. The results of the estimates suggest that aid depresses tax collection efforts in these countries but encourages the use of domestic borrowing to finance public budgets. Indeed, aid has a significant negative effect on the mobilization of tax revenues, but this negative effect is reversed when aid is crossed with the control of corruption. This means that controlling corruption is a good channel to reverse the negative effect of aid on the mobilization of tax revenues. In addition, the aid has a significant and positive effect on the net claims of the government. However, the results show a threshold effect, which is the sign that this positive influence is decreasing according to the level of aid. Thus, assuming an increase in public spending not covered by the aid, the governments of the countries involved in the study will be tempted to resort to domestic borrowing instead of considering increasing tax revenues. The major economic risk of such an option is the crowding out of the private sector. But, this assumes the existence of a negative relationship between public spending and private investment.

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Corresponding Author: Jean Marie W. Kébré[1]
[1](Ministry of Economy, Finance and Development, Burkina Faso)