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Abstract

In recent years, there has been increasing interest in the impact of conflict on taxation, and a few articles have focused on aid effectiveness in conflict-affected countries. Both aid and conflict have been identified as major determinants of tax performance; however, there is little agreement on the nature of their individual and joint effects on taxation. This study contributes to this debate by considering a sample of 123 developing countries over the period 1984 to 2014. Our findings show that aid granted during a period of conflict positively affects revenue collection, and this impact increases with technical assistance. A deeper analysis demonstrates a non-linear relationship between aid provided during conflict times and domestic revenue mobilization. The institutional environment appears to be a factor that may mitigate, and even reverse, the nature of the relationship between aid and revenue mobilization.

Keywords: Domestic Revenue Mobilization, Tax, Foreign Aid, Technical Assistance, Conflict, Institutional Environment, GMM-System, PSTR.

JEL Classification: D74, F35, H20.

1. Introduction

There is a well-established literature about the effects of foreign aid on domestic revenue mobilization (DRM). However, the findings of previous studies are at mixed (see McGillivray and Morrissey (2001), Morrissey (2015) for a summary). On the one hand, some authors such as Pack and Pack (1990), Azam *et al.* (1999), Gupta *et al.* (2003), and Benedek *et al.* (2012) find that foreign aid undermines domestic revenue collection by discouraging the government tax effort and the motivation to undertake tax reforms. On the other hand, Morrissey *et al.* (2014), Clist and Morrissey (2011), Brun *et al.* (2011a) find that foreign aid has no negative effects on tax performance. This strand of the literature justifies their results by the fact that foreign aid is often tied to conditionalities such as tax and institutional reforms which offset the negative effects mentioned above.

In recent years, there has been an increasing interest in the impact of conflict on domestic revenue mobilization. Gupta *et al.* (2004) and Boogaard *et al.* (2016) argue that conflict situations tend to reduce tax collection substantially, due mainly to disruptions to economic activities, the destruction of infrastructure and administrative capacity, and the loss of control over important tax bases. Conversely, Addisson *et al.* (2002) show that conflict may encourage countries to increase their tax performance to fund military expenses. Relatedly, authors like Downing (1992), Ertman (1997), and Tilly (1990) find that conflict may increase tax compliance.

However, these studies have not assessed empirically whether the effect of conflict on taxation could be mitigated by foreign aid. Burnside and Dollar (2000), Collier and Dollar (2001 and 2004), and Ndikumana (2015) have attempted to address this issue, but here again there is little agreement on the nature of the individual and joint effects of foreign aid and conflict on taxation.

This study contributes to the debate by focusing on a sample of large 123 developing countries from 1984 to 2014. We estimate the effects of foreign aid on DRM in conflict-affected countries using the GMM-System method (system of generalized method of moments) estimator, developed by Blundell and Bond (1998), to address potential endogeneity issues. In the GMM-System estimation, we used two external instruments and constrained the number of internal instruments as recommended by Roodman (2009) and Bazzi and Clement (2013).

Our findings show that foreign aid positively affects the revenue collection during conflict times. We also distinguish between Technical assistance and non-Technical assistance aid. It turns out that both types of foreign aid improve DRM and that the positive impact mentioned above increases with the importance of technical assistance. Furthermore, we find that the relationship between aid and DRM during conflict periods is nonlinear. Institutional variables such as government stability, government effectiveness, and extent of corruption tend to mitigate, and even reverse, the nature of the relationship as suggested earlier by Burnside and Dollar (2000), and Collier and Dollar (2001 and 2004).

The reminder of the paper is organized as follows. Section 2 discusses the relationship between aid, taxation, and conflict. Section 3 presents the empirical strategy and discusses the main results. Section 4 concludes.

2. Aid, Conflict, and Taxation

As noted above the literature on the relationship between foreign aid on DRM during conflict times has not reached a consensus. The effect of aid on DRM during conflict period varies: some papers document a negative impact of aid while others obtained non-significant or even positive effect.

2.1. Foreign aid and taxation

Negative relationship. Foreign aid could exercise a negative effect on tax effort, especially if it is mostly provided as grants. Rodriguez *et al.* (1998) found evidence of a negative relationship between aid and tax effort in Pakistan. For a sample of five South East Asia countries, from 1955 to 1976, Khan and Hoshino (1992) showed that grants reduced the tax effort whereas loans increased the tax effort. Azam *et al.* (1999), Gupta *et al.* (2003), and Benedek *et al.* (2012) also showed that grants discourage government tax revenue mobilization. They found that loans have a positive effect on tax effort because the loan must be repaid.

Non-significant relationship. Several papers have asserted that there is no effect of foreign aid on DRM. Clist and Morrissey (2011), Morrissey *et al.* (2014), and Clist (2014) using similar find no evidence that foreign aid affects DRM. According to Morrissey *et al.* (2014), the negative effect found by some papers in the literature, is explained by the conditionalities surrounding the disbursement of foreign aid to the recipient countries. For instance, in some foreign aid programs, trade liberalization is an integral component of the conditionalities. Several developing countries (which rely mainly on trade revenue) were forced to reduce their trade tariffs in return for foreign aid. Because such trade liberalization is followed by a reduction in tariff revenue, foreign aid flow is associated with a decrease in tax revenue. Another reason raised by Morrissey *et al.* (2014) is the double causality effect. Most of the studies examining the effects of foreign aid on taxation, fail to address the potential endogeneity of foreign aid flow with respect to DRM. Furthermore, in the donor community (mostly multilateral institutions), foreign aid is based on country macroeconomic and institutional performances (including the tax performance), therefore, foreign aid flow increases when the tax ratio increases. Finally, the major foreign aid recipients are the poorest countries which have difficulty to change their tax ratio or to exploit their tax potential (See Keen and Simone (2004) and Teera and Hudson (2004)). Thus, the low tax revenue performance might be associated with some intrinsic characteristics of low-income countries rather than the tax effort.

Positive relationship. Some other authors documented that foreign aid improves domestic tax collection. Pack and Pack (1990) concluded that there is a positive relationship between foreign aid and taxation in Indonesia. Otim (1996) found, for a sample of three Asian countries, that both grants and loans resulted in an increase of tax effort. Brun *et al.* (2011a) found a positive effect of foreign aid

on a tax effort indicator based on Stotsky and WoldeMariam's (1997) approach. They showed that the link between foreign aid and tax performance depends on the quality of institutions. They also showed that the relationship does not change with different components of foreign aid (grants or loans).

2.2. Conflict and taxation

Conflict as a source of taxation. A cross-country experience shows that interstate conflict encourages the more belligerent party to increase tax collection in order to fund military expenditure (Addisson *et al.,* 2002). Also, conflict may make citizens more willing to bear heavy tax burdens (Downing 1992, Ertman 1997, Tilly 1990). According to Tilly (1990), the formation of states in early modern Europe was rooted in war. The Sri Lanka government undertook a set of reforms in terms of tax mobilization to fund the defense budget, which reached more than US$ 1 billion per year before the peace deals with Tamils rebels (IMF, 1999). In the interstate conflict between Eritrea and Ethiopia, from 1998 to 2000, both sides increased the mobilization of resources through indirect and customs tax to finance war. The issue is whether such revenue increase during conflict times could be consolidated into gains in taxation and state capacity.

Conflict reduces tax collection. Some empirical studies show that conflicts have a significant negative effect on tax revenue mobilization (Gupta *et al.* 2002, Addison *et al.* 2004). In a recent study on tax revenue mobilization in conflict-affected developing countries, Boogaard *et al.* (2016) found no evidence of a general, sustained, positive impact of civil conflict on revenue collection prior to or during conflict. Gupta *et al.* (2002) and Addison *et al.* (2004), Boogaard *et al.* (2016) explain the erosion of tax bases (disruptions to economic activities), the destruction of infrastructure and administrative capacity, and the loss of control over important tax bases. Foreign aid could reverse the negative impact of conflict on tax performance. According to the authors above, this works through three main factors: more technical assistance, enforced conditionalities, and the extension of state's legitimacy and monopoly in terms of taxation.

2.3. Foreign aid and taxation during conflict times

Some authors with established expertise on conflict-affected countries have argued that aid produces positive effects only in well-governed post-conflict countries (Burnside and Dollar 2000; Collier and Dollar 2001 and 2004). In 2002, the World Bank's Task Force on low income countries under stress (LICUS, the precursor of the 'fragile states' classification) concluded that aid does not work well in fragile countries because of the lack the capacity, or the inclination, to use finance for poverty reduction (World Bank 2002).

In the same vein, according to Ndikumana (2015), the economic argument against aid for post-conflict countries and fragile states is based on the premise that the gains from aid arise from alleviating market failures, especially through the provision of public goods. Post-conflict countries and fragile states face government failures which are the adverse consequences of government

action or inaction rather than market failures, so the concern cannot be addressed by an injection of foreign aid. He argues that in a framework where good governance is considered as a prerequisite for aid allocation, post-conflict countries and fragile states are at a severe disadvantage.

However, empirical investigation and field evidence, have shown that the arguments against aid to post-conflict and fragile states are weak. Easterly (2003) and Easterly *et al.* (2003) found that the arguments of aid ineffectiveness in post-conflict states are not statistically robust, and so not reliable. From a practical perspective, there is substantial evidence of the positive effect of aid in some of the most difficult situations, including in fragile states and post-conflict countries. The World Bank's 2001 evaluation report found that World Bank-supported project outcome ratings in fragile and conflict-affected states do not show significantly worse ratings than in other countries (World Bank 2011a).

In fact, aid could be effective in difficult situations like in conflict-affected countries. In such environment donors must be innovative and adapt their approaches to local conditions (Manor 2007; Chandy and Linn 2011). Aid can achieve excellent results in fragile states when it is appropriately targeted, designed, and delivered (Chandy 2011). In this context, Ndikumana (2015), underlined that micro-level evidence suggests that successful donor interventions in post-conflict countries and fragile states have either built on existing local institutional strengths, or found ways to circumvent local institutional deficiencies. He gave one example of each case. An example of building on strengths, is the program funded by Save the Children Norway in Ethiopia, the Alternative Basic Education for Children out of School (ABEC), which leverages the organizational sophistication of the local administration, to build domestic support and ensure sustainability (NORAD 2004; Baird 2010). An example of circumventing deficiencies is the provision of health services in the rural sector in Afghanistan through NGOs and private actors. A key to the success of the program was the use of a bidding process that results in signed, time-limited, performance-based partnership agreements (Chandy 2011).

2.4. Technical assistance and Domestic Revenue Mobilization

Overall, the positive effects of technical assistance are often underestimated, probably because this component of foreign aid has led to the acceptance of painful reforms by developing countries (Brun *et al.* 2007, 2011b). Several analyses have focused on these negative aspects and neglected the positive contribution of technical assistance. All categories of aid destined to conflict-affected countries, such as foreign aid to refugees, food aid, medical care, foreign aid for peace keeping, technical assistance contribute to state building. However, unlike the other forms of foreign aid flows, technical assistance has a direct link with performance in terms of tax revenue mobilization. In addition, technical assistance allows conflict and post-conflict countries to better formulate and execute their budgets, and to have a good concept for, and implementation of, reforms.

Ndikumana (2015) notes that a range of donors and international organizations provide support for building tax capacity in conflict-affected countries. Prominent actors include the IMF, the OECD, and a range of bilateral donors such as Germany, Norway, the United Kingdom, and the United States.

Moore *et al.* (2015) report that many organizations which provide capacity building services to tax administrations have their roots in OECD countries, and offer training and advice that fits with their own values and priorities. Whilst these principles are broadly accepted by the international community, there is an awareness that effective tax reform in fragile states is hampered by capacity constraints, which require different capacity building strategies depending on the institutional context (IMF 2015).

According to the 2014 OECD report on fragile states, the approaches for donors in supporting revenue mobilization in fragile states can be grouped in five themes: (1) donors should encourage fragile states to broaden their tax base by focusing on direct taxation (often through simplified tax rates); (2) donors should help fragile states to design frameworks to manage natural resource revenues better; (3) donors should help fragile states in their interaction with multinational enterprises—enhancing the transparency and governance of tax incentives, transfer pricing regimes (as done in Rwanda), and supply chains; (4) donors can set an example by being transparent about development co-operation (and exemptions related to it); (5) donors can encourage fragile states to boost tax morale among citizens by strengthening the link between revenue collection and responsible expenditure management. As for broadening the tax base, the top priority in post-conflict countries is to strengthen customs systems and regulations. Customs posts at borders and ports are often the targets of corruption and the place where illicit taxation thrives. Well-connected business leaders and top politicians often control networks involving police, customs, and immigration officials (Gastrow, 2011). It is widely recognized that strengthening the capacity of customs posts, systematic scanning and audit, and the reform of customs revenue systems are effective ways to broaden the resource base.

2.5. Conditionalities

From the experience of developing countries, it appears that most of the conditionalities surrounding donors' funds s are related to government expenditure. The donors usually require transparency in government expenditure to ensure that there is no diversion of funds. On the revenue side, conditionalities are less common. However, one could take as examples the few cases of conditionalities on revenue which have existed in post-conflict states. For instance, in Guatemala, in May 1997, some months after signing the peace agreement, the IMF made an important step by including in the stand-by arrangement, an increase of almost 50 percent of the tax-to-GDP ratio. In 2002, the European Union granted a budgetary support to Mozambique by requiring an increase of the collection of domestic revenue. One of the key points of the international support framework for Afghanistan, during the five years after the conflict, was an increase of domestic revenues from 4.5 percent of GDP in 2004-05 to 8 percent in 2010-11.

In summary, the relationship between aid, conflict, and tax revenue mobilization is not clear cut and depends on of the composition of aid, the conditionalities associated with the aid, and the institutional factors. In the sections below, an empirical investigation is conducted.

3. Empirical evidence about the interaction between aid, conflict, and taxation

3.1. Methodology

GMM-System

We estimate a standard tax performance model by assessing the nature of the individual and joint relationships of aid and conflict with taxation by using the estimator of system of generalized method of moments (GMM-System) developed by Blundell and Bond (1998) to address the endogeneity issue. There is a potential reverse causality between tax and aid, given that the decision of donors in terms of amount and composition of the aid may be motivated by the financing needs of the receiving country, that is its under-performance in tax revenue collection. Furthermore, the tax performance of aid dependent countries could change in line with the conditionalities related to the foreign aid. This is particularly true in conflict-affected countries which may experience a lack of alternative sources of funding. As for the relationship between conflict and taxation, here again, endogeneity is a concern because internal conflicts may be related to social unrest due to unfair tax legislation. Also, in a highly decentralized system, the differences in tax potential and revenue productivity may increase the development gap between regions, creating a climate favorable to requests for country's partition.

We use a panel data model of the form:

$$\text{Tax}_{it} = \alpha + \eta_i + \text{Tax}_{it-1} + \beta_1 \text{Granty}_{it} + \beta_2 \text{Conf}_{it} + \beta_3 (Granty_{it} * \text{Conf}_{it}) + \delta' X_{i,t} + \varepsilon_{it} \qquad (1)$$

Tax_{it} is the ratio of tax revenue in percent of GDP of country i at time t, and Tax_{it-1} is the one period lagged dependent variable. Granty_{it} is the total grant flow received by the country in percent of GDP. Conf_{it} corresponds to the level of conflict experienced by the country. $Granty_{it} * \text{Conf}_{it}$ is the interaction term between the latter two variables. The term η_i is the country specific effect, ε is the unobserved random error term. The vector X represents the set of control variables and δ' is the associated vector of parameters. We use as control variables the logarithm of GDP per capita, the imports and exports shares of GDP, the annual growth of broad money and the agricultural added value in percent of GDP. The GDP per capita is used as a proxy for the level of development with which the demand for public goods increases according to the Wagner's law; in addition, it gives an idea of the potential tax base. The level of national outcome is usually found to be positively related to the domestic tax revenue mobilization (Stotsky and WoldeMariam 1997 and Chambas 2005). The trade openness is expected to be positively associated with the domestic tax revenue performance. The same case occurs with imports given that in developing countries a large part of the VAT collected is levied on imports (Baunsgaard and Keen 2010). Exports are assumed to be negatively related to tax revenue mobilization due to the refunding of VAT revenue at the border. The annual growth of broad money being an indicator of financial openness, it is assumed to increase the potential revenue collection; however, the tax incentives granted by developing countries with the purpose of developing their financial sector, or attracting foreign direct investment, might

undermine the positive effect of the increase of financial flows. A higher inflation rate is assumed to reduce domestic tax yields consistent with the well-known Tanzi-Olivera effect. The agricultural share of GDP is substantial in developing countries; however, many difficulties arise in the taxation of this sector due to the dominance of informal, small activities (Aguire and Yücelik 1981, Stotsky and WoldeMariam 1997).

We follow the recommendations of Bazzi and Clement (2013) to ensure the consistency of the GMM-System estimator and introduce two external instruments Z_1 and Z_2 in our estimations. These instruments are related to the distance between donors and receivers, and the primary fiscal balance of the donors. They were computed according to the method of Tavares (2003), Brun *et al.* (2007). The procedure is as follows:

- Z_1 - for each developing country/donors (OECD countries[1]) combination we selected the five biggest donors per year, then we weighted the grants provided by these countries by the inverse of the distance between the receiver and each donor.

- Z_2 – the same methodology was used, except in this case we use the primary fiscal balance of the five biggest donors instead of the inverse of the bilateral distance.

In addition, to produce robust estimates, we limit the number of internal instruments to be generated as recommended Roodman (2009) given that instrument proliferation can overfit endogenous variables and fail to expunge their endogenous components.

Panel Smooth Transition Regression (PSTR)

The Panel Smooth Transition Regression (PSTR) was proposed by Gonzales *et al.* (2005) and Fok *et al.* (2005). This method allows the assessment of a nonlinear relationship between the outcome variable and the variable of interest. Its particularity, as compared to the traditional Panel Transition Regression Model (PTR) developed by Hansen (1999), is that it gives a generalization of the PTR by allowing the regression coefficients to change smoothly when moving from one regime to another. In addition, it allows the capture of heterogeneity in panel data. The heterogeneity in the regression coefficients is allowed for by assuming that these coefficients are bounded continuous functions of an observable variable, namely the transition variable, which may be time-varying and individual-specific (Gonzales *et al.,* 2017). Given the variance in the results of the previous studies relative to the association of aid and conflict with taxation, by using this model we go into more detail in our analysis by testing a potential non-linearity in this relationship[2]. We use a two-regime PSTR model by changing the structure of equation (1) as follows:

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[1] To be as accurate as possible, we include all OECD countries in this analysis.

[2] The PSTR was employed by Yohou *et al.* (2016) to examine the heterogeneous effects of foreign aid on tax revenue due to government stability in the West African Economic and Monetary Union countries.

$$\text{Tax}_{it} = \eta_i + +\beta_0' C_{it} + \beta_1' C_{it} T(\omega_{it}; \gamma, \tau) + \varepsilon_{it} \tag{2}$$

C_{it} is the set of all independent variables which are assumed to be exogenous. β_0' is the associated vector of parameters for the first regime and β_1' is the associated vector of parameters for the second regime; $T(\omega_{it}; \gamma, \tau)$ represents the transition function; ω_{it} is the bounded transition variable corresponding either to government effectiveness or level of corruption in this study. The 2 extreme values of the level of corruption are associated with regression coefficients β_0 and β_{0+1}, its value determines $T(\omega_{it}; \gamma, \tau)$ and the regression coefficients $\beta_0 + \beta_1 T(\omega_{it}; \gamma, \tau)$. Following Teräsvirta (1994, 1998), Jansen and Teräsvirta (1996), Teräsvirta *et al.* (2010), and Gonzales *et al.* (2017), we use the logistic specification:

$$T(\omega_{it}; \gamma, \tau) = (1 + \exp(- \gamma \prod_{j=1}^{m}(\omega_{it} - \tau_j)))^{-1} \tag{3}$$

With

$$\begin{cases} \gamma > 0 \text{ and} \\ \tau_1 < \tau_2 < \cdots < \tau_{1m} \end{cases}{}^3$$

$\tau = (\tau_1, \dots, \tau_m)'$ is a vector of location parameters with m dimension[4] and γ is the slope parameter determining the smoothness of the transition.

The predicted results may be interpreted as follows:

- For $m = 1$, the change being centered around τ_1, the model implies that the 2 extreme regimes are associated with low and high values of ω_{it} with a monotonic transition of the coefficients from β_0 to β_{0+1} given that ω_{it} increases. When $\gamma \to \infty$, the transition function becomes an indicator function $I[\omega_{it} > \tau_1]$ defined as $I[E] = 1$ when the event E occurs and 0 otherwise. Here, the PSTR is close to the two-regime PTR as the transition is abrupt.

- For $m = 2$, when γ →∞, the model represents a 3 regime PSTR model;

- For m > 0, when $\gamma \to 0$, the model corresponds to a traditional panel fixed effects model because the transition function becomes constant.

3.2. Data and Stylized Facts

We use an unbalanced panel of 123 developing countries from 1984 to 2014. Data on tax revenue are extracted from the dataset of ICRG (2016) which a combination of data from reliable sources such

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[3] These restrictions are imposed for identification purposes.

[4] It is unusual to encounter instances where $m > 2$ (Gonzales *et al.,* 2005).

as IMF Article IV, and for Sub-Saharan African countries from the database of Mansour (2014).[5] Data on total grants, total grants excluding technical assistance, and grants provided in the form of technical assistance, are from the World Bank and OECD. Data on control variables namely GDP per capita, exports, imports, agriculture value added, and annual growth of broad money are drawn from the World Development Indicators dataset of the World Bank. The distance data is from the database of Santoni (2017), and the data for primary fiscal balance from the IMF GFS dataset to calculate the two instruments.

The transition variables used in the PSTR analyze, corruption and government stability, come from the ICRG (2016) database on institutional factors. We normalized these variables in giving high scores to countries with poor institutional quality.

Regarding conflicts, the data are from the armed conflict dataset, constructed jointly by the Department of Peace and Conflict Studies, Uppsala University and the Centre for the Study of Civil War at the International Peace Research Institute, Oslo (PRIO). It is a worldwide dataset which was first presented by Gleditsch, Wallensteen, Eriksson, Sollenberg and Strand (2002). An armed conflict is defined as contested incompatibility that concerns government and/or territory where the use of armed force between 2 parties, of which at least 1 is the government of a state, results in at least 25 battle-related deaths. UCDP/PRIO has several versions of the conflict dataset. In this study, we chose the country/year version of the UCDP/PRIO armed conflict dataset, structured for quantitative analysis. This dataset includes variables containing information on conflict onset and incidence at country level for each country in the international system. We use the variable "Int" corresponding to the intensity level of the conflict, and split conflicts into minor armed conflict (coded as 1) when the country has 25 to 999 battle-related deaths in a given year, and war (coded as 2) when there are at least 1,000 battle-related deaths in a given year.

The statistics are presented in Table 4 in the appendix. The standard deviations, notably for the tax, conflict, and aid variables are not important and show a relative homogeneity for the sample. However, further investigation shows that the tax revenue mobilized during conflict times is lower than that collected in peace time (see Figure 1) suggesting a decrease in tax performance during conflict, as found by Gupta *et al*. (2002) and Addison *et al*. (2004). The same occurs with aid, Figure 2 shows that countries receive more grant in peace time. So foreign support may be regarded as an additional incentive for peace because aid could substitute for domestic revenue or enhance its mobilization. By plotting the time series of aid, conflict, and taxation, we find a negative correlation between them even when considering aid provided during conflict times, or the amount of technical assistance (See Figure 3 and Figure 4 in the appendix). Multiple regression analysis, considering the relative influence of all the predictor variables, is a better way to conduct such analysis, so the following empirical findings are assumed to be more relevant.

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[5] We must specify that we are considering only the non-resource tax revenue for this analysis by excluding the resource tax revenue due to the relative exogeneity of the latter. (See Brun, Chambas and Mansour (2014) for further details).

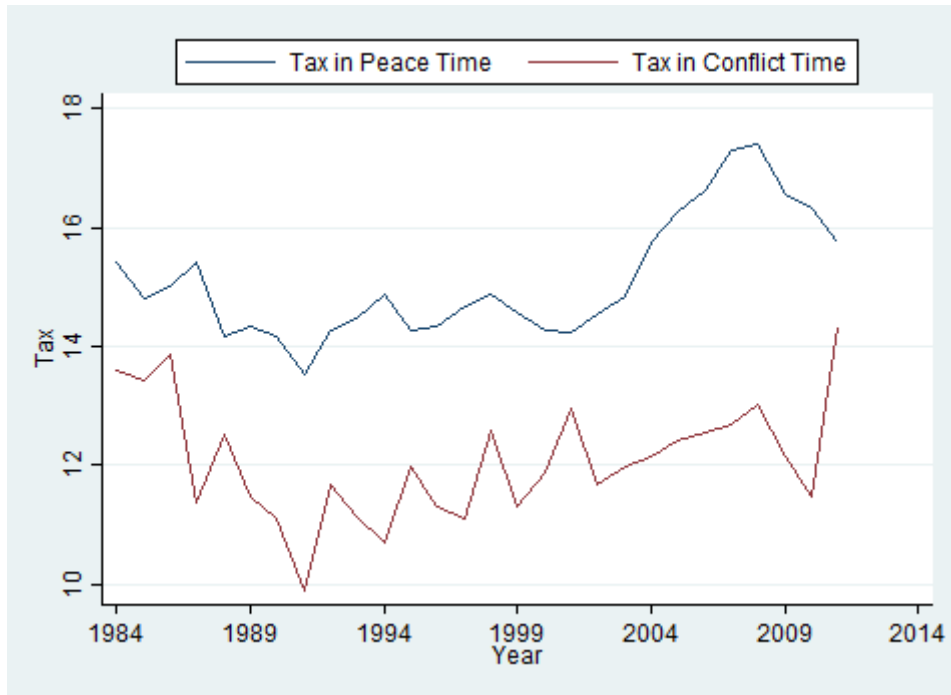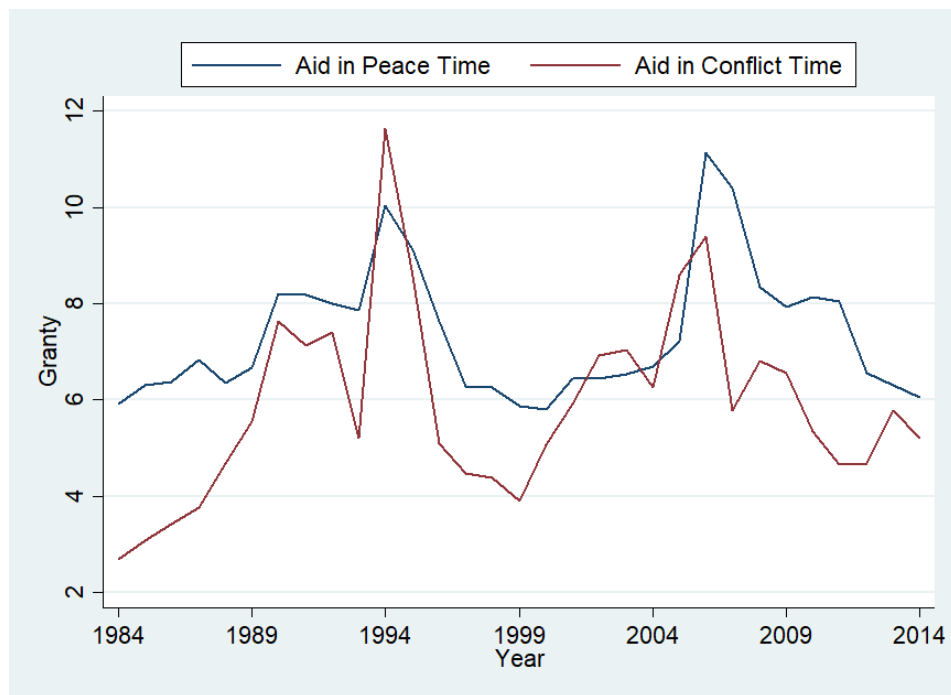**Figure 1: Changes in Developing Countries Tax Revenue**

Figure 2: Changes in of Aid Flows

3.3. Empirical Findings

The estimates from the GMM system were done by including the variables of interest one by one (See Table 1 below) starting with aid, then adding conflict, and finally the interactive variable conflict x aid which captures the effect of grants provided during conflict times. The results of the first estimation show that foreign aid is harmful to DRM and this result remains negative and significant with the other 2 regressions. For conflict, we found a significant negative impact, like Gupta *et al.* (2002) and Addison *et al.* (2004), which can be explained by the disorder created in such situations. However, it is interesting to note the positive impact of grants provided during conflict times. According to the results, a percentage point increase in foreign aid provided to conflict-affected countries increases the tax to GDP ratio by 0.04; this impact increases when we use the grants provided as Technical assistance as the dependent variable (Table 6 in the appendix). This robustness check shows that a percentage point increase in Technical assistance is translated into a 0.68 increase of the tax to GDP ratio. Even when considering only grants excluding technical assistance, we find a positive effect of aid during conflict times. Also, we find that the positive effect of aid during conflict times does not depend on the composition of the aid. These results prove that the arguments against aid effectiveness in fragile states are not statistically corroborated with the sample used in this paper.

For the control variables, the signs of their coefficients are consistent with those assumed even if those of the agriculture share in GDP and the annual growth of broad money are not significant. Nevertheless, we find a statistical significance for these variables in ordinary least squares and two stage and panel fixed effects estimates.[6]

For the quality of the GMM System estimations, it is important to stress that they pass all the standard diagnostics. In fact, there is no evidence of first- or second-order residual autocorrelation. In addition, the validity of the instruments is confirmed by the Hansen tests.

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[6] The results of the ordinary least squares and panel fixed effects estimates are presented in Table 7 in the appendix.

Table 1: Impact of Aid and Conflict on Tax Revenue Mobilization

VARIABLES	(1) Tax	(2) Tax	(3) Tax
Tax_(-1)	0.782***	0.826***	0.782***
	(0.0390)	(0.0317)	(0.0598)
lY	0.487*	0.356*	0.591*
	(0.271)	(0.202)	(0.329)
Xy	-0.0613***	-0.0414***	-0.0383**
	(0.0134)	(0.0113)	(0.0166)
My	0.0578***	0.0303***	0.0522***
	(0.00845)	(0.00677)	(0.0144)
Vag$y$	-0.0199	-0.0102	-0.0152
	(0.0240)	(0.0150)	(0.0295)
lBmg	-0.0870	0.292***	-0.0880
	(0.0730)	(0.0932)	(0.0957)
Grant$y$	-0.0290***	-0.0178***	-0.0339***
	(0.00353)	(0.00311)	(0.00886)
Conf		-0.186*	-0.590**
		(0.0999)	(0.229)
Grant$y$ x Conf			0.0429**
			(0.0188)
Constant	-0.0308	-0.348	-1.340
	(2.434)	(1.885)	(2.894)
Observations	1,712	1,712	1,712
Number of id	119	119	119
Arellano-Bond test for AR (1)	-4.34	-4.58	-4.27
p-value	0.000	0.000	0.000
Arellano-Bond test for AR (2)	-0.35	-0.04	-0.18
p-value	0.728	0.965	0.854
Hansen test	33.11	69.53	43.14
p-value	0.193	0.123	0.380

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

To check for robustness, we employ the Panel smooth transition regressor estimator to assess a potential non-linearity of the association of grants during conflict times and taxation, related to the quality of institutions (as supposed by Brun *et al.,* 2011a). Table 2 and Table 3 show that linearity is

strongly rejected for this association (See the LM Tests).[7] In using government stability as a transition variable, the slope parameter in Table 2 indicates that the transition is abrupt. The coefficient of the interactive variable (grant x conflict) is positive and significant[8] in a first regime then in a second regime it becomes insignificant. This means that aid provided during conflict times increases the tax-to-GDP ratio until the instability of government reaches 7.34 out of 12 where its impact is undermined. For corruption, if we find a positive effect of grant during conflict times, when the level of corruption reaches 4.12 out of 6, the nature of the relationship is reversed with a statistically negative significance in a second regime. The latter findings show the positive effects of grants on tax revenue mobilization during conflict times, while proving the importance of institutional factors in terms of aid effectiveness. Poor institutional quality can undermine, even reverse, the positive impact of aid provided to fragile states.

Table 2: Panel Smooth Threshold Regression (PSTR) Estimates using "Government Stability" as Transition Variable

PSTR Parameters			
γ (Slope Parameter)	603.6293		
ω (Estimated location parameters)	7.3346		
Coefficients of Control Variables			
First Regime		**Second Regime**	
IY	2.6876***(0.3974)	IY	0.1056*(0.0610)
Vagy	-0.0586***(0.0163)	Vagy	-0.0211**(0.0098)
My	0.0366***(0.0133)	My	0.0424**(0.0177)
Xy	-0.0203(0.0138)	Xy	-0.0720***(0.0163)
IBmgy	-0.3834***(0.0982)	IBmgy	0.2683**(0.1291)
Granty	-0.0241(0.0160)	Granty	0.0358*(0.0190)
Granty*Conf	0.0526**(0.0235)	Grant*Conf	-0.0197 (0.0284)
Conf	-0.4781**(0.2136)	Conf	-0.4902**(0.2410)
LM Test (Fischer)		10.819 (0.000)	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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[7] It should be recalled that we use both the government stability variable (which is an assessment both ability of government to carry out its declared program and to stay in office), and the corruption variable which assesses the corruption within the political system.

[8] The value of this coefficient (0.05) is like that of the GMM-system regression (0.04).

PSTR Parameters			
γ (Slope Parameter)	30.0509		
ω (Estimated location parameters)	4.1222		
Coefficients of Control Variables			
First Regime		**Second Regime**	
IY	4.0030***(0.3982)	IY	-0.1512**(0.0625)
My	0.0581***(0.0129)	My	-0.0302 (0.0477)
Xy	-0.0508***(0.0103)	Xy	0.0310(0.0450)
Granty	0.0061(0.0128)	Granty	-0.1039**(0.0435)
Granty*Conf	0.0400**(0.0166)	Grant*Conf	-0.2333***(0.0902)
Conf	-0.8043***(0.2254)	Conf	5.8336***(1.5197)
LM Test (Fischer)		5.658(0.000)	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4. Conclusion

This study assesses the impact of grants during conflict times on tax revenue mobilization. Using robust GMM-system estimations, we find a significant positive effect of aid on conflict-affected countries' tax performance, and the effect increases with an increasing amount of technical assistance. The more detailed analysis permits a contribution to the debate on this association by predicting a non-linearity related to institutional factors. This means that according to the quality of institutions, fragile countries may observe positive, insignificant even negative effects of aid, which does not call into question the role of international aid.

Aid could help to maintain state legitimacy with citizens during conflict and post-conflict times. As government revenue decreases during conflict, the failure to pay salaries and ensure responsibilities in terms of education, justice, and health could lead to the state's disintegration. The flow of external foreign aid, especially for budget support, could ensure the functioning of the state. In addition, military support in conflict-affected countries through peace-keeping missions could help to extend the state monopoly of taxation nationwide. The reduction of illegal taxation by armed groups or their suppression has 2 dimensions. On the one hand this enhances security, and on the other hand it could improve the level of public revenue mobilization. For example, capturing profits related to the exploitation of natural resources from rebel groups like that in the Cambodian forest, not only

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[9] Here, we take out agriculture value-added and annual growth of broad money to get significant estimates.

allows the government to impose security but gives it substantial revenue (Le Billon 2000c). In other words, when war lords levy tax on the trade of goods, including tax on smuggling like in Afghanistan and in Ivory Coast (from 2002 to 2011), this prevents the state not only from taxing but also from exercising its sovereignty nationwide.

During post-conflict situations, there is a big need to build capacity for DRM to finance basic public goods. In this context, technical assistance has a more positive and significant effect on taxation. It enables conflict-affected countries to improve their tax revenue management. Especially, in post-conflict countries it establishes tax discipline and creates a stable environment that enhances economic recovery. It helps to improve the tax collection systems and practices and increases the productivity of tax administrations. Furthermore, unlike the other types of foreign aid, technical assistance has less crowding-out effect on DRM. In fact, technical assistance is a transfer of knowledge and skills, and it is not a substitute for other sources of public revenue. Technical assistance, through external support, either in fiscal or other capacity development, would be most effective if the new techniques and procedures strengthen the existing capacity instead of being a substitute for them.

Elsewhere, besides the crucial need to improve the quality of institutions, there is a need to adapt the assistance to local conditionalities. Many development agencies employ some of the most competent local professionals, and their presence in a conflict affected country could lead to a "dual public sector", distort accountability, and send a signal to citizens that their government cannot be trusted (Di John, 2010b). Ultimately this is said to create a "negative feedback effect on DRM" (Boyce, 2008). However, according to Ndikumana (2015), a recent World Bank study finds that the provision of public services by donors, and non-state actors, can strengthen rather than undermine the relationship between citizens and the state (Sacks, 2012).

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Appendix

Table 4: Descriptive statistics

	Mean	Standard Deviation	Min	Max
Tax	14.62	7.47	0.09	59.37
Y	6297.83	10937.82	115.79	94903.2
My	46.67	29.25	0.016	424.82
Xy	38.10	26.94	0.01	231.19
Vagy	18.58	14.61	0	93.98
Bmg	41.07	334.30	-99.875	12513.1
Granty	7.17	12.46	0	241.71
Granty_etcy	5.19	10.39	0	239.98
Tcy	1.97	3.73	0	68.47
Conf	0.18	0.48	0	2
Granty_Conf	1.15	6.63	0	186.20
Granty_etcy_Conf	0.92	5.64	0	159.11
Tcy_Conf	0.22	1.18	0	33.86
Z1	196.50	573.59	-5.56	10671.1
Z2	3878.23	199328.5	-178435	1.20e+07
Gov_Stab	7.48	2.23	0.67	12
Corruption	2.52	1.03	0	6

Table 5: Source of Data

Data		Source
Tax	Tax revenue	ICTD (2016) and Mansour (2014)
GDP per capita	Gross Domestic Product per Capita	World Development Indicators, WB
My	Imports in GDP percent	World Development Indicators, WB
Xy	Exports in GDP percent	World Development Indicators, WB
Vagy	Agriculture value-added in GDP percent	World Development Indicators, WB
Bmg	Annual growth of broad money	World Development Indicators, WB
Granty	Total Grant in GDP percent	World Bank and OECD
Grant_etcy	Grant excluding Technical assistance in GDP percent	World Bank and OECD
Tcy	Technical assistance in GDP percent	World Bank and OECD
Conf	Conflict	UCDP/PRIO armed conflict dataset
Z1	First Instrument	Santoni (2017), WB, OECD
Z2	Second Instrument	IMF, WB, OECD
Gov_Stab	Government Stability	ICRG (2016)
Corruption	Corruption	ICRG (2016)

Table 6: Robustness Checks

VARIABLES	Grant_etcy Tax	Tcy Tax
Tax_(-1)	0.760***	0.774***
	(0.0670)	(0.0336)
IY	0.486	0.626*
	(0.385)	(0.377)
Xy	-0.0387**	-0.0346***
	(0.0169)	(0.0116)
My	0.0521***	0.0501***
	(0.0143)	(0.0112)
Vagy	-0.0269	-0.0147
	(0.0312)	(0.0481)
IBmy	-0.0967	-0.211**
	(0.101)	(0.0906)
Granty	-0.0313***	-0.0165
	(0.00716)	(0.229)
Grant*Conf	0.0499**	0.681*
	(0.0197)	(0.363)
Conf	-0.456*	-1.753
	(0.239)	(1.075)
Constant	-0.0183	-1.162
	(3.595)	(3.222)
Observations	1,712	1,451
Number of id	119	119
Arellano-Bond test for AR(1)	-4.18(0.000)	-4.01(0.000)
Arellano-Bond test for AR(2)	-0.23(0.819)	-0.78(0.433)
	41.67(0.442)	28.30(0.132)
Hansen test		

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: OLS and Panel Fixed Effects Estimations

OLS and Fixed Effects Estimates

VARIABLES	(OLS) Tax	(Fixed Effects) Tax
IY	0.715***	3.391***
	(0.203)	(0.334)
Xy	-0.165***	-0.0789***
	(0.00984)	(0.00758)
My	0.193***	0.0646***
	(0.00937)	(0.00647)
Vagy	-0.151***	-0.0794***
	(0.0155)	(0.0140)
IBmy	-0.350***	-0.158**
	(0.131)	(0.0661)
Granty	-0.0457***	0.00304
	(0.0175)	(0.00915)
Grant*Conf	0.0189	0.0462***
	(0.0250)	(0.0171)
Conf	-1.296***	-0.817***
	(0.290)	(0.199)
Constant	11.22***	-9.192***
	(1.811)	(2.718)
Observations	2,089	2,089
R-squared	0.331	0.188
Number of id		123

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

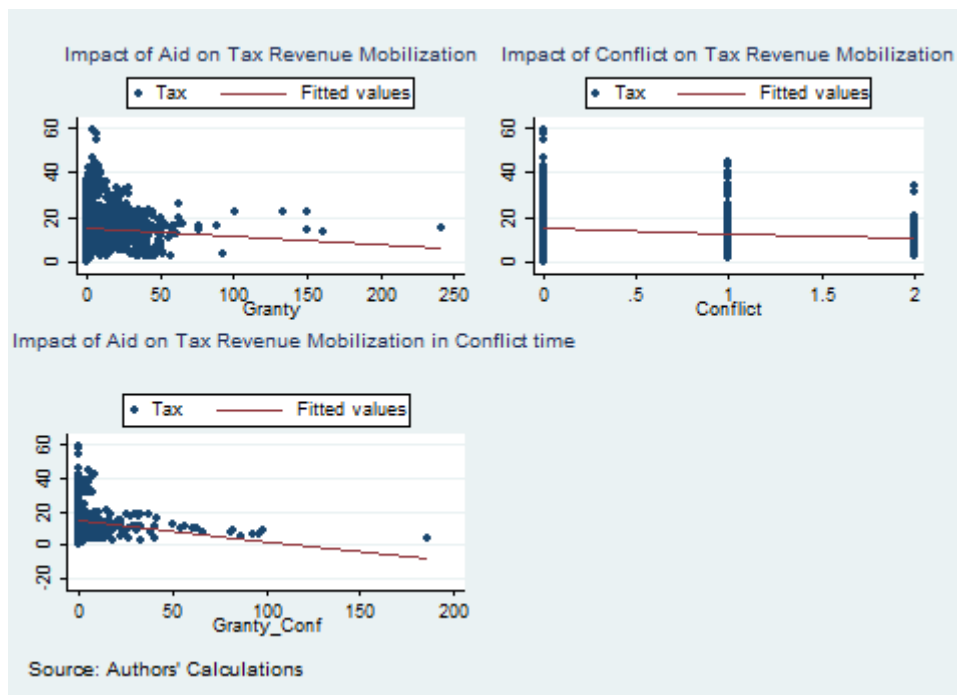**Figure 3: Relationship between Aid, Conflict and Taxation**

Source: Authors' Calculations

Figure 4: Relationship between Grant and Taxation in Peace and Conflict Times

Source: Authors' Calculations
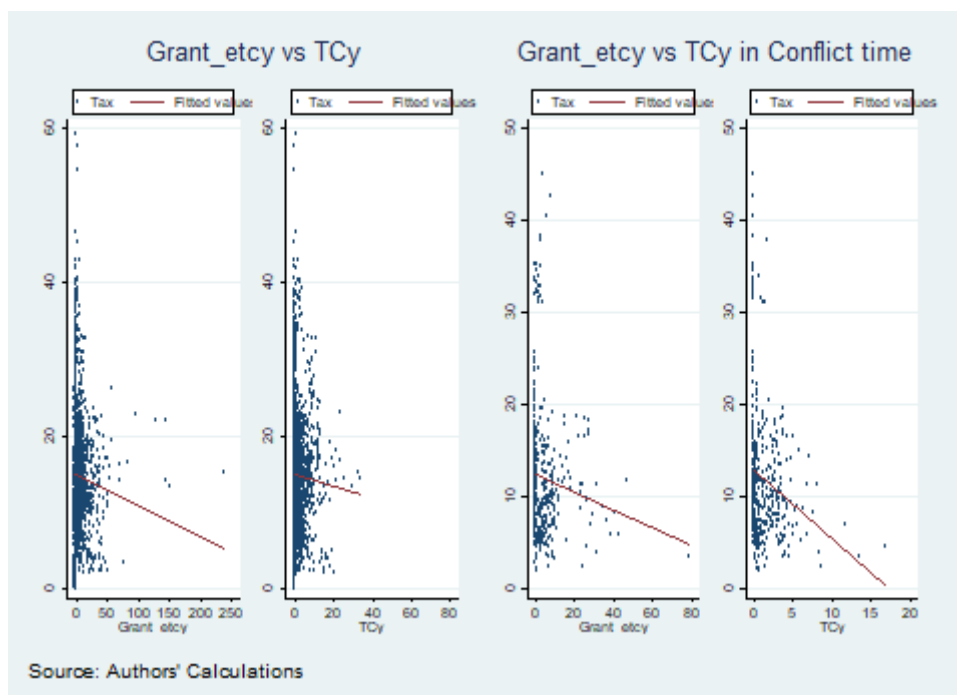
"Sur quoi la fondera-t-il l'économie du monde qu'il veut gouverner? Sera-ce sur le caprice de chaque particulier? Quelle confusion! Sera-ce sur la justice? Il l'ignore."

Pascal

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