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Does Aid Hinder Tax Efforts? More Evidence

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José Antonio Alonso & Carlos Garcimartín

Abstract

During recent years, new doubts about the effectiveness of international aid have emerged. One of the arguments employed to justify this sceptical view is that aid can hinder tax effort in developing countries. Nevertheless, empirical research on the aid-tax nexus is inconclusive and it shows some shortcomings in the tax database employed and in the variables considered in the estimation. The main goal of this article is to overcome these shortcomings. The main results are twofold: i) income distribution is a crucial determinant of tax revenues; and ii) once income distribution is taken into account, aid shows no significant impact on tax revenue; not even when we control for institutional quality.

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Outline

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1. Introduction

Taxation is an essential aspect in development, as it affects the economic behaviour of individuals, modifying the incentives to work, save, consume, or invest. It also determines the potential of the public sector when it comes to supplying goods and services and implementing redistribution and stabilisation policies. Lastly, it involves an exchange of tax resources for representation and citizenship that lies at the core of the social contract (Tilly, 1992; Moore, 2002). Therefore, a sound tax system becomes an essential requirement for the progress of nations. As pointed by the OECD (OECD, 2008): "Tax is not the sole determinant of rapid development but it is one pillar of an effective state, and may also provide the basis for accountable and responsive democratic systems."

In accordance with this view, international aid should strengthen developing countries' tax systems. But does aid really contribute to achieving this goal? During recent years, we have witnessed a renewed scepticism about the effectiveness of international aid, fuelled not only by meticulous research (Rajan Subramanian, 2005, for example), but also by essays with a high media impact (Moyo, 2009, for example). One of the arguments employed to justify this sceptical (or even negative) view of aid is that aid can be detrimental to developing a sound tax system in recipient countries. Since taxes can be unpopular and more subject to social scrutiny, aid can be a disincentive for governments to collect taxes or to implement tax reforms. In such a case, aid can depress tax revenues. However, empirical research is inconclusive on this subject. Pioneering studies found a negative impact of aid on tax revenues (Heller, 1975; Cashel-Cordo and Craig, 1990; Khan and Hoshino, 1992), but more recent works are more ambiguous. Thus, for example, according to Bräutigam and Knack (2004), aid reduces tax revenue in the recipient country. Morrissey et al. (2007), Teera and Hudson (2004), and Ouattara (2006) do not find any robust effect of aid on tax revenues. Meanwhile Gupta (2007) and Brun et al. (2007) find a positive relationship between aid and revenue performance. Finally, Clist and Morrissey (2011) go even further and find that since the late 1980s there is some evidence that aid is associated with increases in tax revenue. Their inference is that the beneficial effects of policy reforms associated with aid that improved tax

effort (such as better tax collection and public sector management) or the tax base (increased output of productive sectors) outweigh aid conditions, such as tariff reductions, that reduce tax revenue.

In our opinion, empirical research on the aid-tax nexus shows four main shortcomings. First, some of these works do not implement a prior analysis on the determinants of tax revenues. Second, the possibility that the impact of aid on taxes is conditional upon the institutional quality level of the recipient country is rarely considered. Third, there are scarcely any studies that have considered income distribution as a determinant of tax efforts, and as we shall try to show, this is a crucial determinant. And finally, most if not all of the research using cross-country or panel databases employ only central government revenues. In samples including highly-decentralised countries and/or nations with high social contributions, as is usually the case, this can lead to significant mistakes.

The main goal of this paper is to overcome these shortcomings. Unfortunately, as there is no standard international general government tax database, we have begun by building —using different regional and national sources— a database that takes into account social contributions and regional and local government data, to an acceptable extent. This database has then been used to analyse tax revenue determinants, in order to avoid any relevant omitted variable bias. Finally, we have estimated the impact of aid on taxes using different econometric techniques (static and dynamic panel models), and controlling for institutional quality. The main results stemming from this analysis are twofold. On the one hand, although income distribution has rarely been incorporated into the aid-tax nexus empirical models, it turns out to be a crucial determinant of tax revenues. According to our estimates, its exclusion causes the apparently negative effect of aid on taxes. On the other hand, once general government data and income distribution are taken into account, aid loses its significance. Aid shows no significant impact on tax revenues; not even when we control for institutional quality.

The remainder of paper is organized as follows. In section two, the main approaches to the tax/aid nexus are discussed: aid fungibility studies, fiscal response models, and analysis of countries' tax efforts. Following the latter approach, we investigate in section three the determinants of tax efforts, incorporating aid into the

regressions in section four. Finally, the main conclusions are considered in last section.

2. Aid's impact on taxes: main approaches

Five decades ago, Kaldor (1963) pointed out that "the importance of public revenue to the underdeveloped countries can hardly be exaggerated if they are to achieve their hopes of accelerated progress". Yet, donors have given limited attention to the effects of foreign aid on recipient countries' tax revenues. In fact, the sign of the relationship between aid and taxes cannot be assessed *a priori*. Through international aid, donors can contribute to improving developing countries' tax system design, to strengthening the technical and institutional capacities of their tax administrations, and to improving the economic activity, thus increasing tax revenues. But, at the same time, international aid can be a less politically costly revenue source for governments, thus decreasing tax efforts. In sum, the effect of aid on taxes is in principle ambiguous. In fact, neither theoretical models nor empirical analyses provide a clear-cut answer to the question of the impact of aid on taxes[1]. Three main approaches can be found in this field: i) *aid fungibility* studies, which in some cases consider the effect of aid not only on public spending, but also on public revenues; ii) *fiscal response* models, where aid is part of a government's optimization problem; and iii) pure empirical analysis of *tax effort determinants*.

Regarding *aid fungibility studies*, these investigate whether aid does actually finance the public spending components to which it is addressed. Early studies are based on a maximization problem that determines the behavior of the representative agent's utility in recipient countries. Inspired by the McGuire model (1978) of local authority responses to federal grants in education, in the case of aid it is considered that governments provide S public goods to satisfy citizen needs. A proportion of aid (ϕ) is fungible, so it funds part of these goods in a supplementary way to domestic revenues; another portion is not fungible (1-ϕ) and must finance the particular public goods to which it is addressed (K; K<S). Based on these assumptions, a utility function is defined in which private goods, public goods funded with fungible aid and

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[1] Good surveys of this literature can be found in McGillivray and Morrisey (2000 and 2004) and Brun et al. (2008)

national resources, and public goods funded with non-fungible aid are included. The amount of public goods supply depends on prices, while the aggregate public spending is limited by the budget constraint (defined by aid and domestic resources). Prices and aid are considered exogenous. Following this approach, some studies analyse the relation between taxes and aid, obtaining inconclusive results. For example, Khilji and Zampelli (1991) find a negative relation between aid and taxes in the case of Pakistan, while Swaroop et al. (2000), in a study on India, do not find any significant effect of aid on taxes.

Another group of aid fungibility studies, instead of developing a complete utility maximization model, build an equation system in which different choices of public spending and types of public revenues are considered, subject to the budget constraint. However, the findings of these works are no less ambiguous. For example, Cashell-Cordo and Craig (1990), in a sample of 48 developing countries, find a positive effect of aid on taxes in the case of Sub-Saharan countries, but not in the rest of countries; Pack and Pack (1990) and Gupta (1993) confirm this positive effect in the cases of Indonesia and India, respectively; while, Pack and Pack (1993) find a negative effect between both variables in the case of Dominican Republic. Besides these contradictory results, the main problem with the aid fungibility approach is that tax revenues (and other resources) are considered a residual factor.

Fiscal response models try to develop a more integral view of the effect of aid in recipient countries on government behavior. They allow governments to define revenue and expenditure targets in an utility maximization process. Aid, like tax and borrowing, is considered as a kind of revenue, and public spending is subject to one or more budget constraints[2]. Based on Heller (1975), the utility function is defined as a quadratic expression of the distances between actual variables and targets: the bigger the distance, the larger the utility lost. One of the main problems of this approach is in defining the targets pursued. They are usually defined either through empirical estimation (mainly by using time series) or through equations integrated

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[2]   In the case of using two budget constraint equations, the model is over-constrained (as White, 1994, showed), and if spending is equalized to all resources and domestic borrowing, complete fungibility is assumed. For this reason Franco-Rodriguez et al. (1998) proposed an inequality equation as budget constraint, accepting that public fiscal decisions are subject to pressures from different interest groups.

into the maximization exercise. Yet, both mechanisms are subject to criticism (White, 1994).

Following the fiscal response approach, a first generation of works assume that aid is an exogenous variable (for example, Heller, 1975; Gang and Khan, 1991; Khan and Hoshino, 1992; Rubino, 1997; Iqbal, 1997; or McGillivray, 2000); while a second generation consider aid as endogenous (for example, Franco-Rodríguez et al., 1998; Franco-Rodríguez, 2000; McGillivray and Ahmed, 1999; or Mavrotas and Ouattara, 2006); and, in some cases, aid is disaggregated into different components (Mavrotas, 2000; Mavrotas and Ouattara, 2006). These empirical studies also show contradictory results. For example, Heller's pioneering study (Heller, 1975), based on eleven African countries, confirms that aid has a negative effect on tax revenues, but Khan and Hoshino (1992), in a work on five Asian countries, reach the opposite conclusion; Ouattara (2006), analyzing 46 developing countries, finds that the relationship is not significant; and finally, Lloyd et al. (2009), applying VAR techniques to 19 low- and middle-income countries, find that in those countries where aid turns out to be significant, it tends to be negatively associated with tax revenue.

In the case of national studies the results are no more robust. For example, Ghan and Khan (1991), in a study on India, as well as Iqbal (1997) or McGillivray (2000) in the case of Pakistan, consider that there is no effect of aid on taxes; Franco-Rodríguez et al. (1998) find a negative relationship in the case of Pakistan, but Franco-Rodríguez (2000) obtains the opposite conclusion in a study on Costa Rica; and Osei et al. (2005) show a tenuous positive relationship in the case of Ghana. Finally, in those cases in which aid is disaggregated, the different effect of aid components is confirmed. For example, Khan and Hoshino (1992) show that grants reduce tax effort, while loans increase it; Mavrotas (2002a and b), in a study on India and Kenya, confirms that project aid has a lower crowding-out effect on taxes than program aid; and Mavrotas and Ouattara (2006), in a study on Ivory Coast, show that the aggregate aid effect on tax revenues is negative, but this effect is confirmed only in the case of project and program aid, not in the case of technical assistance or food aid.

In sum, it seems that this approach is far from providing robust conclusions. The results obtained are very sensitive to model specifications, to the way in which targets are determined in the utility function, and to the quality and dimension of data.

Additionally, to admit that the utility function takes the form of a perfectly symmetric loss function (with the same lost of utility in the case of targets exceeded as in the case of targets not met) is questionable. Finally, fiscal response models operate basically in a static framework, but it seems unrealistic to admit that government objectives are stable over time: an assumption that is not in accordance with economic experience (McGillivray and Morrissey, 2004).

Finally, the third approach tries to identify the variables that determine *countries' tax efforts*. Empirical evidence shows that the capacity to collect taxes is conditioned by general country characteristics (such as the urbanization level), by economic variables (trade openness or the share of agriculture in GDP), and by institutional variables (institutional quality, public accountability, or corruption). There is a long list of works within this tradition, some of them in reference to developing countries (Chelliah, 1971; Chelliah et al., 1975; Tanzi, 1992; Leuthold, 1991; or Stotsky and WoldeMariam, 1997; among others). Nevertheless, only some of these studies incorporate foreign aid among the explanatory variables, finding different results regarding the impact of aid on taxes. Thus, Bräutigam and Knack (2004) analyse the effect of aid on taxes by regressing the tax revenue variation on its initial value, aid, population growth, per capita GDP growth, and a political violence proxy. According to their findings, the initial value of tax revenue, aid, and political violence are the only significant variables with negative signs. Since they use a convergence-type regression, their modelisation implies that a country's long-term tax revenue depends solely on aid and political violence; nothing else matters. Furthermore, since the estimated value of the initial tax-revenue value is not significantly different from 1, taxes seem to adjust instantaneously to their equilibrium level. In our opinion, both conclusions are hard to accept.

Gupta (2007) reaches a different conclusion. He studies the determinants of tax revenue in developing countries using an unbalanced panel. The dependent variable is tax revenue as a percentage of GDP, while the explanatory variables are GDP per capita, the share of agriculture and imports in GDP, foreign debt and aid as a percentage of GDP, some institutional variables (corruption, law and order, government stability, political stability, and economic stability), and some tax policy variables (tax structure, the highest corporate and income tax rate, and average

tariffs). According to his findings, there is a strong positive relationship between aid and revenue performance, both in the static model and in the sys-GMM model.

The approach followed by Brun et al. (2007) is different. They first regress tax revenue on some structural variables (GDP per capita, the weight of imports and agriculture in GDP, and the share of fuel and mineral exports in total exports). The residual of this estimation is interpreted as a measure of each country's fiscal effort. Next, they regress this fiscal effort on three types of variables: 1) macroeconomic policy (primary deficit, debt service, inflation, and real exchange rate); 2) aid (total amount, grants, loans, and instability of aid); and 3) institutions (corruption, public administration quality, and democratic responsibility). According to their findings, aid impacts positively on tax revenue. With regard to the quality of institutions, it is interesting to note that, broadly speaking, its direct effect on tax revenue is nil, but the quality of bureaucracy determines to what extent aid increases tax revenues.

Gupta et al. (2003) investigate if the impact of aid on tax revenue depends on its composition. Their results show that, while loans have a positive effect, the opposite occurs in the case of grants. Yet, according to Brun et al. (2007), aid impacts positively on tax revenue, independently of the form that it takes: grants or loans. Morrissey et al. (2007) do not find any difference either; and Clist and Morrisey (2011), using data for a sample of 82 developing countries, find no robust evidence for a negative of aid (grants or loans) on the tax to GDOP ratio. In fact, they find some evidence that the effect of grants on tax effort is positive since a break point in the mid 1980s. Finally, Teera and Hudson (2004) do not find any robust effect of aid on tax revenues.

In sum, as in the other two approaches, it is also difficult in this case to obtain a robust conclusion. However, in our opinion, four main shortcomings can be identified in the literature on the aid-tax revenue nexus. Firstly, while some works do explicitly investigate the variables apart from aid affecting tax revenue, key variables are missing in others. Thus, for example, Bräutigam and Knack (2004) do not control for agriculture or international openness, two variables that can determine tax revenue and that are usually incorporated into tax revenue regressions. Secondly, as stated above, the literature on the impact of aid on development has stressed that this impact depends on the quality of institutions. Some works in the tax-aid literature have taken this possibility into account by incorporating a multiplicative variable into their

regressions (Brun et al., 2007), but most of them have not. Thirdly, there is hardly any work that considers income distribution as a determinant of tax revenue. Nevertheless, inequality is an important factor that conditions not only the capacity to collect taxes, but also the legitimacy of public institutions to do so, and the social disposition to pay. Finally, there is a very serious problem in most studies using cross-country data sets: they employ central government data provided by the IMF Government Finance Statistics, or by the World Bank Development Indicators. For countries that are highly decentralised and/or where social contributions amount to a significant percentage of GDP, the use of central government data may lead to very inaccurate estimates and conclusions.

It is important to consider some consequences of this last shortcoming. For example, Gupta (2007), after analysing the determinants of tax revenues, builds up a revenue performance index to rank countries according to their revenue efforts. He states that "On the other hand, countries like Argentina, Brazil, Peru, Panama, United Arab Emirates etc. have revenue performance indices well below 0.75, which suggests that they have yet to achieve their full revenue potential". And he also concludes that "Countries that have failed to realize their revenue potential include countries from Latin America and Eastern Europe like Argentina, Costa Rica, Latvia, Lithuania and the Slovak Republic." This is clear-cut example of misleading conclusions stemming from the use of central government data. On average for the period 1996/2006, central government tax revenue in Brazil reached 14.2% of GDP; a figure that seems to support Gupta's findings. Yet Brazil is a very decentralised country, where social contributions amount to a large percentage of GDP. General government tax revenue (including social contributions) is at 30.4% of GDP, more than twice the central government revenue and very close to some rich countries' tax revenue. In other words, Brazil is not very far from reaching its revenue potential, as claimed by Gupta; in fact, the opposite is true. The same error occurs with respect to some other countries that, according to Gupta, have failed to achieve their revenue potential. Central government revenue in Argentina (1996/2006 average) is 10.3%, but general government revenue reaches 22.6%; the figures for Colombia are 11.0% and 16.2%, respectively; Costa Rica, 12.5% and 19.5%; Panama, 9.5% and 15%; Slovak Republic, 17.8% and 33.1%; and Lithuania, 18.7% and 29.7%.

Another good example of this mistake can be found in Teera and Hudson (2004). In their analysis of the impact of aid on taxes, they state that "Switzerland, with the highest GNP per capita (43,306 US$) has a tax ratio of only 19% as compared to that of, say, Netherlands (43.7%), with a per capita GNP of 22,520 US$". They use central government data, not taking into account that Switzerland is a highly-decentralised country, while the Netherlands is not. On average for the period 1996/2006, central government tax revenue plus social contributions reached 37.1% of GDP in the Netherlands, and 17.3% in Switzerland. Yet, general government figures are 39% in the former and 29.1% in the latter; that is, only two points higher in the Netherlands but twelve in Switzerland.

To our knowledge, only Gupta et al. (2003) point out this problem, but they consider appropriate the use of central government data, on the grounds that "Since most foreign assistance is routed through the central government Budget, the nonavailability of data on revenue collected at the subnational level should not be a major handicap"[3] But the argument is extremely weak, since it only holds for single-country studies, where central government revenues are independent of regional government revenues, and for a sample period when the territorial financing system has not been reformed. Finally, let us remark that, to our knowledge, Brun et al. (2007) is the only non-regional cross-country analysis in the tax-aid empirical literature not using the IMF Government Finance Statistics or the World Bank Development Indicators. They build up their own database, but unfortunately they do not specify whether general or central government tax revenues are employed.

In sum, to analyse the impact of aid on taxes, it is necessary to use general government data —at least for those countries that are highly decentralised and/or with high social contributions— and to account for all relevant determinants of tax revenues. Otherwise, a serious omitted variables problem can emerge. In the next section, we will try to estimate the impact of aid on taxes while overcoming these shortcomings.

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[3] Gambaro et al. (2007) use the same argument. Bird et al. (2004) also point out that the use of central government data can lead to an underestimation of tax revenues in those countries where subnational governments are important. However, they use central government data in their analysis.

3. Tax revenue determinants

As suggested Clist and Morrissey (2011), the tax effort studies are based on a structural model in which tax/GDP ratio is a function of two components: the tax rate and the tax base. The studies try to identify proxy variables to capture (aggregate) tax rate and base. Aid is not part of this structural relationship, but it could have a behavioural effect on tax collection. For this reason, it is important to control aid effect for all main determinants of tax revenues. Furthermore, it is likely that the aid effect on tax revenues in not contemporaneous, so we should introduce some lags in the variable.

Income per head is the variable most widely used to explain tax revenue differences across countries. As income increases, so do the demand for public expenditure (Tanzi, 1987) and the capacity to pay taxes (Musgrave, 1969). With regard to the tax-aid studies, this variable is significant in most of them, although not for example in Gupta et al. (2003) or Morrissey et al. (2007). Other variables that can condition tax revenue are related to the structure of output. A large agricultural sector can hinder revenues, since the sector is characterised in many countries by myriad micro and informal transactions, which are difficult to tax. The negative impact of agriculture on tax revenues has been supported by the works of Chelliah (1971), Chelliah et al. (1975), Tanzi (1992), Leuthold (1991), and Stotsky and WoldeMariam (1997), among others. Fuel and mining sectors can also determine tax revenues, but their contribution is more ambiguous. On the one hand, they are easy to tax, but on the other, governments can be tempted to obtain non-tax revenues from these sectors using royalties, state-owned firms, or even non-transparent means. Thus, while Tanzi (1981) or Alm et al. (2004) find a positive impact of mining, Stotsky and WoldeMariam (1997) find the opposite result.

The degree of international trade is also supposed to affect tax revenue. Yet, the impact is also ambiguous (Gupta, 2007; Keen and Simone, 2004). On the one hand, imports and exports are easy to tax, since they take place at specific locations. Therefore, the higher the openness rate, the larger the tax revenue. But on the other hand, a low protection level (and consequently low international trade taxes) may increase the openness rate, and thereby taxes and openness rates would be inversely related. Lotz and Morss (1967) or, more recently, Bahl (2003) find a positive relation between both variables, while according to Tanzi (1992) and Gupta (2007), a positive

relation   occurs between taxes and imports, and according to Stotsky and WoldeMariam (1997), between taxes and exports.

Inflation may also affect tax revenue, and again the effect is ambiguous. On the one hand, a negative impact can be expected due to the following reasons (Ghura, 1998). Firstly, according to the Tanzi-Olivera effect, in an inflationary environment, tax revenues can decrease in real terms due to the lag between tax payments and tax obligations. Secondly, excise duties are sometimes levied at specific rates that may not necessarily be adjusted with inflation (Tanzi, 1989). Finally, with high inflation rates, taxpayers, in order to protect the real value of their wealth, can adjust their assets in favour of those that escape taxes (land, jewels, and foreign capital). In fact, Ghura (1998) finds a negative impact of inflation on tax revenue. Yet, on the other hand, in progressive tax systems the opposite can be true, since tax rates can be adjusted to inflation with a significant lag, thus increasing revenues.

More recently, some works have identified institutional quality as another variable affecting tax revenue. Bird et al. (2004) found that corruption, rule of law and entry regulations determine tax revenue. According to Ghura (1998), Gupta et al. (2003) and Gupta (2007), corruption has a negative impact on revenues, while Gupta (2007) also found that political and economic stability also influences tax revenue, but this result was not very robust.

In addition to these determinants traditionally considered in the aid-taxes literature, we have included in our regressions another variable that, in our opinion, can have a large impact on tax revenues: income distribution. A very unequal income distribution can impact on tax revenues through two main ways: i) In a very unequal society, there will be a more prominent informal sector, that will hinder tax collection; ii) And economic elites will be more reluctant to pay taxes and will have more power to resist any increasing-resources tax reform. Yet, income distribution has been rarely considered as a factor conditioning tax revenue in the aid-taxes empirical works. A remarkable exception is the work by Gupta (2007), who finds that the tax structure influences tax revenue: as the weight of direct taxes increases, so does total revenue. According to his interpretation, since indirect taxes tend to be regressive, they exacerbate inequality and reduce the tax base[4]. However, the tax

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[4]   Bird et al. (2004) also find that inequality decreases tax revenue, but their result is not very robust

structure is a poor proxy for income distribution, so we have preferred to use the Gini index in our analysis.

Our (unbalanced) panel covers developed and developing countries. The sample period ranges from 1990 to 2007, and each variable has been computed as a three-year average. Unfortunately, accurate and homogeneous data are lacking for the Gini indices and for tax revenues, so different sources have been employed (see Annex). Finally, it must be noted that income distribution and income per head are considered endogenous. The former needs no further explanation, and with respect to the latter, taxes can indirectly impact on income through institutional quality (Alonso and Garcimartin, 2010)[5].

With regard to the pooled models (IV and OLS), all variables are significant, except fuel in the IV regression (table 1). In addition, the under- and over-identification tests indicate that the instruments used are appropriate. Regarding the fixed effects (FE) regression, no variable is significant. This is a surprising result, since at least income per head is strongly expected to be significant. Nevertheless, because this estimation technique does not take into account information across countries, but only over time, this result, far from being a proof of the irrelevancy of the variables considered, is in our opinion a consequence of the short time dimension of our (strongly unbalanced) panel. In fact, when we use random effects (RE), income per head, income distribution, fuel, and openness all become significant. In addition, the Hausman test indicates that random effects are preferable to fixed effects for our panel.

Regarding dynamic models, no variable is significant in the dif-GMM regression, while only openness is significant in the sys-GMM model (table 2). This result is partially due to the high collinearity that exists between income per head and agriculture (the coefficient of correlation reaches 0.86). When agriculture is dropped from the estimation, income per head, fuel, and openness become significant in the sys-GMM model. However, as was the case with the fixed effects model, the dynamic panel results must be taken cautiously, given the short time dimension of our (strongly unbalanced) panel.

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[5]   As instruments for GDP per head, we have employed its 9-year lagged value, while as instruments for the Gini index, we have used, following Alonso and Garcimartin (2010), the 9-year lagged GDP, its squared value, and ethnic fragmentation.

Table 1. Tax Revenue Determinants. Static Panel								
	Pooled OLS		Pooled IV		FE		RE	
Variable	Value	t-ratio	Value	t-ratio	Value	t-ratio	Value	t-ratio
Per capita GDP	0.188	7.01	0.199	5.26	1.313	0.99	0.244	5.92
Gini index	-0.509	-8.19	-0.784	-5.32	-2.413	-0.90	-0.620	-3.14
Fuel and metals	0.019	2.10	0.015	1.25	0.038	1.49	0.020	2.09
Agriculture	-0.141	-4.26	-0.108	-2.36	0.412	0.96	-0.022	-0.57
Openness rate	0.174	6.28	0.177	5.13	-0.096	-0.31	0.175	5.76
Inflation	0.028	2.64	0.033	1.93	-0.028	-1.83	-0.006	-0.71
Endogenous	GDP per head, Gini index							
Instruments	9-year lagged GDP per head, (9-year lagged GDP per head)^{2,} ethnic fragmentation							
N	512		488		488 (124 groups, 3.9 obs. per group)			
Adj. R^2 (centered in IV, overall in FE and RE)	0.65		0.64		0.57		0.64	
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)			0.0					
Hansen J statistic (over-identification) (P-value)			0.29					
Hausman Test					0.13			
Robust estimates								

Table 2. Tax Revenue Determinants. Dynamic panel								
	Dif-GMM, two-step (robust)				Sys-GMM, two-step (robust)			
Variable	Value	t-ratio	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue	0.531	7.30	0.543	6.74	0.593	9.35	0.586	9.39
Per capita GDP	0.123	1.57	0.120	1.82	0.037	0.89	0.059	1.96
Gini index	-0.585	-1.55	-0.469	-1.20	-0.228	-1.35	-0.226	-1.44
Fuel and metals	0.019	1.20	0.018	1.08	0.027	1.86	0.027	2.03
Agriculture	0.057	1.23			-0.021	-0.67		
Openness rate	-0.011	-0.40	0.057	1.23	0.104	2.17	0.098	2.16
Inflation	-0.003	-0.42	-0.005	-0.82	-0.003	-0.44	-0.005	-0.93
Groups (average per group)	99 (3.08)		102 (3.05)		120 (3.58)		122 (3.60)	
Additional instruments	Ethnic fragmentation and regional dummies for Eastern Europe and Latin America							
N. instruments	38		37		50		49	

In view of these results, the fixed effects estimation does not seem appropriate, since this technique reduces the panel information to a large extent (it only exploits time information but not cross-country information), and the Hausman test suggests the use of random effects estimation. OLS regressions do not seem adequate either, since they raise problems of endogeneity. Finally, the dif-GMM technique must also be excluded, since no explanatory variable is significant, while the sys-GMM approach must be taken cautiously, given the short time dimension of our (strongly unbalanced) panel.

Regarding the explanatory variables, GDP per head and openness are significant in the three cases that seem adequate (Pooled IV, RE, and GMM-sys), the Gini index in the first two (showing the expected sign in the latter and a t-ratio of 1.44), and fuel in two, while agriculture and inflation are significant only in the IV specification (the latter showing a sign contrary to expected, according to the Tanzi-Olivera effect). In this sense, it must be remarked that two variables, income per head and income distribution, account for a great deal of tax revenue variation. Thus, if income per head is considered the only independent variable in the IV and RE regressions, the R^2 reaches 0.3 (table 3). If the Gini index is added to the regression, the R^2 almost doubles, but if only one of the other explanatory variables is added at a time, the R^2 remains practically constant. Finally, the inclusion of the rest of the variables to the GDP-Gini regressions only accounts for a marginal increase of the R^2. In short, income per head and income distribution are the most powerful explanatory variables of the tax revenue differences across countries. Therefore, the exclusion of income distribution, as is usually the case in the aid-taxes nexus empirical studies, may lead to a serious omitted variables problem.

Table 3. A comparison of the R^2 across estimations		
	IV	RE
Independent variable		
Only GDP per head	0.30	0.30
GDP per head and Gini index	0.59	0.58
GDP per head and openness	0.32	0.30
GDP per head and agriculture	0.34	0.34
GDP per head and fuel	0.30	0.29
GDP per head and inflation	0.36	0.37
All variables	0.64	0.64

Table 4. The Impact of Aid on Tax Revenue						
	IV pooled panel		RE		GMM-sys	
Variable	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue					0.726	5.79
Per capita GDP	0.317	3.82	0.283	4.11	0.065	3.45
Gini index	-0.837	-3.51	-0.659	-3.96	-0.040	-0.30
Fuel and metals	0.023	1.77	0.021	2.17	0.013	1.15
Agriculture	-0.042	-0.44	0.000	0.00		
Openness rate	0.156	3.50	0.175	5.59	0.067	2.03
Inflation	0.041	2.66	-0.007	-0.8	0.004	0.57
ODA	0.036	1.43	0.011	0.74	0.001	0.10
Endogenous	GDP per head, Gini index, ODA					
Instruments (additional instruments in GMM-sys)	ethnic fragmentation, birth rate, population, and regional dummy for Eastern Europe (*)		9-year lagged GDP per head, (9-year lagged GDP per head)^2, ethnic fragmentation, birth rate, and population		ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America	
N	510		487, 123 groups; 4 obs. per group		438, 121 groups; 3.6 obs. per group	
Centered R^2	0.60		0.64 (overall)			
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)	0.0					
Hansen J statistic (over-identification) (P-value)	0.23					
Robust estimates						
(*) Due to over-identification problems, lagged GDP and its squared value are replaced by a regional dummy for Eastern Europe as instrument.						

4. The impact of aid on tax revenues

Once we have analysed the tax revenue determinants, we can incorporate aid into the model. Toward this aim, we have considered ODA as endogenous, using as instruments birth rate (as indicator of recipient needs) and population (as proxy for donors' interest)[6]. The main findings are the following (table 4). First, GDP per head and openness are significant in all regressions, while the Gini index and fuel are

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[6]   As indicators of recipient needs, infant mortality, fertility rate, and life expectancy were also employed. Since the results obtained did not change much, we decided to use birth rate given that more data were available for this variable.

significant in the IV and RE models, but not in the dynamic specification, and inflation is significant only in the IV regression. Second, aid is not significantly different from 0 in any model. In other words, foreign aid does not seem to have any impact on tax revenues[7]. In this sense, it must be remarked that if the Gini index is excluded from the estimation, aid becomes negative and significant in the IV and RE models (at 90% in the former) and positive and significant in the GMM-sys specification (table 5). Therefore, the omission of income distribution (a crucial determinant of tax revenues, as shown above) can seriously bias the results concerning the impact of aid on taxes, and could explain why some previous empirical works have found that aid does have an impact on tax revenue.

Table 5. The Impact of Aid on Tax Revenue. Gini Index Omitted						
	IV pooled panel		RE		GMM-sys	
Variable	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue					0.816	13.92
Per capita GDP	0.493	9.59	0.358	3.82	0.045	2.12
Fuel and metals	-0.009	-0.65	0.001	0.13	0.011	1.34
Agriculture	0.269	3.75	0.159	2.96		
Openness rate	0.217	5.50	0.213	5.42	0.078	1.94
Inflation	0.000	-0.01	-0.011	-1.67	0.004	0.41
ODA	-0.027	-1.87	-0.042	-2.31	0.009	3.19
Endogenous	GDP per head, ODA					
Instruments (additional instruments in GMM-sys)	birth rate and population					
N	705		705, 147 groups; 4.8 obs. per group		606, 150 groups; 4 obs. per group	
Centered R^2	0.36		0.39 (overall)			
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)	0.0					
Hansen J statistic (over-identification) (P-value)	Eq. Exac. Id					
Robust estimates						

[7]   It could be argued that the non-significance of aid could be a consequence of a poor instrumentation of this variable. Yet, it is not significant even if it is considered exogenous: the values and t-ratios for the IV, RE, and GMM-sys models are, respectively (t-ratio in brackets): -0.02 (-1.03), -0.01 (-1.56), and 0.001 (0.15).

4.1 Controlling for institutional quality

As shown in the previous section, once we have controlled for income distribution and all government levels have been taken into account, aid does not seem to have any impact on tax revenues. Yet, some researchers have pointed out that, as happens with regard to growth, the impact of aid on taxes can be conditioned by institutional quality: aid can fuel tax receipts in those countries with good institutions, while it can partially replace taxes in low institutional quality countries For example, Azam et al. (1999) build a theoretical model including the interaction between aid and institutional quality. However, empirical studies rarely consider this possibility. One exception is Gupta et al. (2003), who investigate the impact of aid on tax revenues by constructing sub-samples according to corruption levels. They find that the positive impact of loans on tax revenue decreases as corruption rises. Another exception is Brun et al. (2007), who include in their regressions the cross-product of aid by institutional quality, finding that this variable turns out to be positive in the case of bureaucracy quality.

Therefore, it could be the case that the non-significance of aid in our previous regressions is the consequence of not having controlled for institutional quality. To check this possibility, we have followed the approach suggested by Brun et al. (2007), incorporating into our previous regressions the cross-product of aid by institutional quality. Although this product is composed of endogenous variables, it has been considered exogenous due to the following reasons. First, aid and institutional quality move in opposite directions: the richer the country (and therefore the lower the amount of aid received), the higher its institutional quality. Second, the correlation coefficient between the cross-product of aid by institutional quality and aid is -0.16, and between that product and institutional quality it is 0.32. In other words, it is acceptably low. Third, the correlation coefficients between the residuals and the cross-product of aid by institutional quality are also small, especially in the random effects regression, suggesting that there are no endogeneity problems. Finally, the Wu-Hausman Test indicates that the cross-product of aid by institutional quality can be considered exogenous (table 6).

Table 6. The Impact of Aid on Tax Revenue. Controlling for Institutional Quality. ICRG

Variable	IV pooled panel		RE		GMM-sys	
	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue					0.836	9.60
Per capita GDP	0.297	6.34	0.345	1.99	0.098	3.35
Gini index	-0.912	-7.13	-0.648	-2.15	0.071	0.49
Fuel and metals	0.030	2.35	0.032	1.57	0.011	0.71
Agriculture	0.004	0.08	0.105	1.53		
Openness rate	0.111	1.90	0.131	0.97	0.025	0.47
Inflation	0.029	1.84	-0.015	-1.00	0.000	-0.04
ODA	-0.643	-0.87	-0.393	-0.49	-0.152	-1.59
ODA* Inst. Quality	0.174	0.88	0.107	0.48	0.046	1.64
Endogenous	GDP per head, Gini index, ODA					
Instruments (additional instruments in GMM-sys)	9-year lagged GDP per head, birth rate, population, and regional dummy for Eastern Europe		9-year lagged GDP per head, (9-year lagged GDP per head)^2, ethnic fragmentation, birth rate, and population		ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America	
N	435		435, 104 groups; 4.2 obs. per group		388, 103 groups; 3.7 obs. per group	
Centered R^2	0.69		0.69 (overall)			
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)	0.01					
Hansen J statistic (over-identification) (P-value)	0.11					
Wu-Hausman Test (P-value)	0.15					
Robust estimates						

As a proxy for institutional quality, we have employed the International Country Risk Guide political index (ICRG), and according to our estimates, neither aid nor the cross-product of aid by institutional quality is significant in any regression (table 6). In other words, aid does not seem have any impact on a country's tax revenue, irrespective of its institutional quality. To check the robustness of this result, we have also employed the World Bank Governance Indicators average (GI) as a proxy for institutional quality[8]. As shown in table 7, aid and the cross-product of aid by

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[8]   Since the Governance Indicators were first compiled in 1996, two time observations are lost.

institutional quality are not significant in the RE and GMM-sys regressions and, although they are significant and positive in the IV model, the parameter values seem to be too large. For example, for a country like Brazil, whose tax revenue reaches 30% of GDP and whose Governance Indicators average is about zero, an increase of aid by 1% of GDP would result in an increase of 3% in the tax/GDP ratio. This seems rather hard to believe.

Table 7. The Impact of Aid on Tax Revenue. Controlling for Institutional Quality. GI						
	IV pooled panel		RE		GMM-sys	
Variable	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue					0.687	5.02
Per capita GDP	0.372	3.82	0.327	3.36	0.070	3.59
Gini index	-0.945	-9.33	-0.763	-2.52	-0.024	-0.13
Fuel and metals	0.011	0.67	0.013	0.93	0.010	0.78
Agriculture	0.034	0.37	0.061	0.99		
Openness rate	0.081	1.64	0.189	4.68	0.140	3.21
Inflation	0.054	2.08	-0.001	-0.15	0.004	0.38
ODA	0.107	2.12	0.014	0.33	-0.008	-0.57
ODA* Inst. Quality	0.104	2.15	0.014	0.37	-0.011	-0.98
Endogenous	GDP per head, Gini index, ODA					
Instruments (additional instruments in GMM-sys)	ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America		9-year lagged GDP per head, (9-year lagged GDP per head)^2, ethnic fragmentation, birth rate, and population		ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America	
N	368		357, 119 groups; 3 obs. per group		363, 119 groups; 3 obs. per group	
Centered R^2	0.53		0.61 (overall)			
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)	0.01					
Hansen J statistic (over-identification) (P-value)	0.52					
Robust estimates						

Table 8. The Impact of Aid on Tax Revenue. GDPs in PPP terms						
	IV pooled panel		RE		GMM-sys	
Variable	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue					0.811	10.31
Per capita GDP	0.327	5.62	0.315	1.47	0.103	2.74
Gini index	-0.954	-6.39	-0.704	-2.36	0.063	0.38
Fuel and metals	0.020	1.22	0.034	1.15	0.008	0.46
Agriculture	0.023	0.38	0.094	1.13		
Openness rate	0.077	1.21	0.161	1.05	0.031	0.66
Inflation	0.032	1.86	-0.016	-0.93	0.000	0.04
ODA	-2.320	-1.31	-0.531	-0.25	-0.372	-1.62
ODA* Inst. Quality	0.627	1.33	0.142	0.24	0.110	1.63
Endogenous	GDP per head, Gini index, ODA					
Instruments (additional instruments in GMM-sys)	9-year lagged GDP per head, birth rate, population, and regional dummy for Eastern Europe		9-year lagged GDP per head, (9-year lagged GDP per head)^2, ethnic fragmentation, birth rate, and population		ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America	
N	435		435, 104 groups; 4.2 obs. per group		384, 103 groups; 3.7 obs. per group	
Centered R^2	0.65		0.69 (overall)			
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)	0.02					
Hansen J statistic (over-identification) (P-value)	0.26					
Robust estimates						

On the other hand, it must be noted that in the former regressions, the aid/GDP ratio has been computed by converting the national GDPs (in national currencies) to US Dollars using current exchange rates. The use of current rates can generate large and artificial fluctuations in the aid/GDP ratio that can be a source of error in the estimation of the impact of aid on taxes. To overcome this problem, we have also calculated the aid/GDP ratios by employing GDPs in PPP terms[9]. The results obtained are very similar to those shown above: aid does not seem to have any impact on taxes (table 8).

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[9]   Djankov et al. (2009) also measure the aid/GDP ratio in PPP terms.

Table 9. The Impact of Aid on Tax Revenue. Country dummies. IV pooled panel								
	ICRG		ICRG - PPP		GI		GI - PPP	
	Value	t-ratio	Value	t-ratio	Value	t-ratio	Value	t-ratio
Per capita GDP	0.253	4.00	0.260	4.16	0.334	4.37	0.334	4.34
Gini index	-0.820	-9.65	-0.829	-9.50	-0.638	-7.40	-0.636	-7.48
Fuel and metals	0.014	1.42	0.013	1.18	0.017	1.39	0.018	1.47
Agriculture	-0.042	-0.64	-0.041	-0.61	0.028	0.36	0.028	0.36
Openness rate	0.110	2.35	0.098	2.15	0.065	1.71	0.066	1.77
Inflation	0.036	2.19	0.038	2.08	0.060	2.87	0.060	2.86
ODA	-0.344	-0.61	-1.093	-0.83	0.003	0.10	0.001	0.04
ODA* Inst. Quality	0.091	0.60	0.290	0.83	0.011	0.41	0.019	0.41
Positive dummy	Belarus, Brazil, Burkina Faso, Ivory Coast, Gambia, Kenya, Moldova, Morocco, Russia, Senegal, South Africa, Tunisia. Uruguay, Vietnam, Zambia				Brazil, Burkina Faso, Ivory Coast, Gambia, Kenya, Lesotho, Moldova, Morocco, Russia, Senegal, South Africa, Swaziland, Tunisia, Uruguay, Uzbekistan, Vietnam, Zambia			
Negative dummy	Bangladesh, Dom. Republic, Egypt, El Salvador, Guatemala, Iran, Korea, Mexico, Pakistan, Paraguay, Thailand, Venezuela				Bangladesh, Dom. Republic, Egypt, El Salvador, Guatemala, Iran, Kyrgyz Rep., Lao PDR, Korea, Mexico, Pakistan, Paraguay, Thailand, Venezuela			
Endogenous	GDP per head, Gini index, ODA							
Instruments	ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America							
N	442		442		368		368	
Centered R^2	0.87		0.86		0.84		0.84	
Under-identification test (Kleibergen-Paap rk LM statistic (P-value)	0.05		0.05		0.01		0.02	
Hansen J statistic (over-identification) (P-value)	0.23		0.25		0.32		0.33	

4.2 Country dummies

The coefficients of determination of the previous regressions are relatively low (0.6-0.7). One possible reason is that, although the tax/GDP ratio has common determinants across countries, it can also be influenced by country-specific political, social, and historical factors, which are not captured either by regional dummies or by random effects. In fact, we have detected some important outliers in the sample employed. Tables 9 to 11 show the results of the IV, RE, and GMM-sys models that

incorporate country dummies that turned out to be significant. To check the robustness of the estimates we have used as proxies for institutional quality both the ICRG political risk index and the Governance Indicators average, while the aid/GDP ratio is measured in current and in PPP dollars. Two conclusions must be stressed. First, the coefficient of determination increases significantly when country dummies are included in the regressions, and second, the coefficients of aid and the cross-product of aid by institutional quality are not significant in any regression except one: the GMM-sys model in which institutional quality is proxied by the ICRG political risk index and the aid/GDP ratio is computed in current dollars.

Table 10. The Impact of Aid on Tax Revenue. Country dummies. RE								
	ICRG		ICRG - PPP		GI		GI - PPP	
	Value	t-ratio	Value	t-ratio	Value	t-ratio	Value	t-ratio
Per capita GDP	0.300	2.87	0.271	2.43	0.306	4.25	0.311	4.76
Gini index	-1.115	-6.22	-1.151	-6.20	-0.979	-4.98	-0.962	-4.99
Fuel and metals	0.040	3.44	0.042	2.94	0.028	2.56	0.028	2.64
Agriculture	0.090	1.58	0.076	1.25	0.065	1.18	0.067	1.29
Openness rate	0.160	2.05	0.177	2.42	0.122	3.28	0.124	3.35
Inflation	-0.023	-1.68	0.025	1.83	-0.001	-0.13	-0.001	-0.13
ODA	-0.021	-0.03	0.372	0.24	-0.005	-0.16	-0.006	-0.17
ODA* Inst. Quality	0.008	0.04	-0.097	-0.23	-0.008	-0.35	-0.017	-0.59
Positive dummy	Angola, Brazil, Gambia, Kenya, Moldova, Morocco, Namibia, Russia, South Africa, Zambia				Angola, Brazil, Comoros, Gambia, Kenya, Lesotho, Moldova, Russia, South Africa, Swaziland, Uzbekistan, Zambia			
Negative dummy	Albania, Bangladesh, Egypt, Guinea-Bissau, Indonesia, Iran, Korea, Mexico, Pakistan, Venezuela				Albania, Bangladesh, Egypt, Guinea-Bissau, Indonesia, Iran, Korea, Lao PDR, Mexico			
Endogenous	GDP per head, Gini index, ODA							
Instruments	9-year lagged GDP per head, (9-year lagged GDP per head)^2, ethnic fragmentation, birth rate, and population							
N	435, 104 groups, 4.2 obs per group				357, 119 groups, 3 obs per group			
R^2 (overall)	0.88		0.87		0.87		0.87	

In sum, aid does not seem to have any robust impact on taxes once we take into account general government tax revenues, and income distribution is included as a determinant of tax receipts. This irrelevancy of aid is confirmed when we control for institutional quality and employ national GDPs in PPP terms. On the other hand, the

significant increase on the coefficients of determination of last regressions shows that, although the tax/GDP ratio has common determinants across countries, it also has idiosyncratic factors in some nations related to their particular political, social, and historical conditions.

Table 11. The Impact of Aid on Tax Revenue. Country dummies. GMM-sys								
	ICRG		ICRG - PPP		GI		GI - PPP	
	Value	t-ratio	Value	t-ratio	Value	t-ratio	Value	t-ratio
Lagged tax revenue	0.581	5.31	0.565	5.65	0.457	4.74	0.428	4.68
Per capita GDP	0.088	2.89	0.076	2.08	0.074	2.23	0.067	1.95
Gini index	-0.475	-2.15	-0.515	-2.54	-0.498	-2.27	-0.526	-2.35
Fuel and metals	-0.001	-0.06	0.002	0.11	0.014	1.13	0.013	1.23
Openness rate	0.115	2.39	0.124	2.47	0.180	2.91	0.192	3.05
Inflation	-0.005	-0.47	-0.004	-0.36	0.002	0.24	0.001	0.15
ODA	-0.135	-2.46	-0.264	-1.28	0.009	0.32	0.003	0.05
ODA* Inst. Quality	0.041	2.87	0.080	1.43	0.006	0.29	-0.002	-0.04
Positive dummy	South Africa				South Africa			
Negative dummy	Guinea-Bissau, Egypt				Guinea-Bissau, Egypt			
Endogenous	GDP per head, Gini index, ODA							
Additional Instruments	9 ethnic fragmentation, birth rate, population, and regional dummies for Eastern Europe and Latin America							
N	484, 103 groups, 3.7 obs per group				363, 119 groups, 3 obs per group		364, 120 groups, 3 obs per group	

5. Concluding Remarks

It has been argued that aid reduces the incentives to mobilise tax revenues. Although the empirical evidence in this respect is ambiguous, in our opinion it shows four main shortcomings. First, some of the works do not implement a prior analysis of tax revenue determinants. Second, only a few cases consider the possibility that the effect of aid on taxes is conditional upon the institutional quality level. Third, there are hardly any studies that have considered income distribution as a determinant of tax efforts. Fourth, most if not all of the research that uses cross-country or panel databases employ only central government revenue. In samples including highly-decentralised countries and/or nations where social contributions amount to a high percentage of GDP, as is usually the case, this can lead to important mistakes.

Throughout this paper we have tried to overcome these shortcomings by: 1) implementing a previous analysis of tax revenue determinants, including income distribution; 2) using a database that incorporates regional and local government revenues to an acceptable extent; and 3) controlling for institutional quality. Our main findings suggest that income distribution is a crucial determinant of tax revenue. Its exclusion, as is generally the case in tax-aid empirical works, can seriously bias the results. In fact, according to our estimates, once this variable is included in the regressions and general government data are used, aid does not seem to have any impact on tax revenues, and this result is confirmed when we control for institutional quality, and national GDPs are expressed in PPP terms. On the other hand, it has been shown that, beyond common factors, tax efforts for some countries are also related to their particular political, social, and historical conditions. There is no universal pattern: national particularities also shape the underlying social contract which is taxation.

In our opinion, aid could influence taxes in a particular country in a specific moment in time, but for this to happen, aid must be either of sufficient magnitude or particularly focused on improving tax administrations. Yet aid plays a minor role in many aid-receiving countries, and it is not specially focused on tax administrations. Therefore, it is no surprise that we do not find any effect of aid on taxes in our cross-section analysis[10]. As we have seen, GDP per capita, income distribution, and some country-specific factors have by far the greatest explanatory power regarding tax receipts. There is little room for aid to act as a determinant of tax revenues. Finally, let us remark that, given the limits of our panel concerning the Gini indices and tax revenues, our results must be taken cautiously.

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[10] However, we also estimated the different models for subsamples built according to the aid/GDP ratio, and aid was not significant in any of them, not even for the subsample of highly-dependent countries.

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Appendix. Data Sources and Description of Variables

All variables are in logs, except ODA and the World Bank Governance Indicators (since they can be zero or negative), and are computed as a 3-year average (except the Gini index and the Governance Indicators).

Institutional quality: International Country Risk Guide political index (ICRG) and World Bank Governance Indicators average. Before 2002 these indicators are available only for years 1996, 1998, and 2000. Therefore, for the period 1996-1998 we have computed the 2-year average between 1996 and 1998, while for the period 1999-2001 we have used the value for 2000.

Taxes:

- OECD countries: OECD.

- Latin American countries: ECLAC.

- African countries. African Development Bank (African Statistical Yearbook), except where otherwise indicated.

- Asian countries: Asian Development Bank, except where otherwise indicated.

- Bulgaria, Cyprus, Estonia, Latvia, Lithuania, Malta, Romania and Slovenia: Eurostat.

- Croatia: Central Bureau of Statistics.

- Russia: Ivanova, A. Keen, M. and Klemm. A. (2005): The Russian Flat Tax Reform, IMF Working Paper, WP/05/16.

- Ukraine: Institute for Economic Research and Policy Consulting.

- South Africa: South African Revenue Service.

- Tanzania: Tanzania Revenue Authority.

- Ethiopia: Ministry of Revenue.

- India: Ministry of Finance.

- China: National Bureau of Statistics of China.

- Nigeria, Senegal, Comoros, Sierra Leone, Armenia, Kazakhstan, Moldova, Syria, Yemen, , Brunei, Cambodia, Laos, and Mongolia: IMF Country Reports.

- Rest of countries: World Bank WDI.

Taxes refer to General Government, except for those countries whose data source is AFDB, the World Bank, or ADB (except Bangladesh, Georgia, Kiribati, Kyrgyz Republic, Pakistan, Philippines, Sri Lanka, and Tajikistan, whose data refer to General Government).

Taxes include social contributions, except for Algeria, Angola, Benin, Bhutan, Botswana, Burundi, Cameroon, Central African Republic, Congo, D. R., Congo, R., Djibouti, Egypt, Equatorial Guinea, Fiji, Gambia, Guinea Bissau, Jamaica, Kenya, Kuwait, Kiribati, Kyrgyz Republic, Laos, Lebanon, Liberia, Madagascar, Malawi, Malaysia, Maldives, Mali, Micronesia, Myanmar, Niger, Papua New Guinea, Philippines, Rwanda, Singapore, Solomon, Sudan, Swaziland, Thailand, Togo, Tonga, Turkmenistan, Tuvalu, Uganda, Uzbekistan, Vanuatu, Vietnam, and Zimbabwe. No social contributions data are available for these countries.

Per capita Income: constant PPP per capita GDP. Source: World Bank.

Gini Index: Latest year available. Source: World Bank.

Fuel: Percentage of fuels, ores, metals, precious stones, and non-monetary gold on total exports. Source: UNCTAD.

Agriculture: agriculture value added (% of GDP). Source: World Bank.

Urban: Urban population (% of total). Source: World Bank.

Openness rate: exports plus imports as a percentage of GDP. Source: World Bank.

Inflation: GDP deflator (annual %). Source: World Bank.

Ethnic Fragmentation. Source: Alesina et al. (2003).

ODA: (% of GDP). Net ODA less Humanitarian Aid, Food Aid, and Debt Relief. Source: OECD.

Population: Source: World Bank.

Birth rate: Source: World Bank.