Aid Effectiveness:
A comparison of Tied and Untied Aid

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Abstract

We evaluate the differential effects of Tied and Untied aid on growth, and how these effects vary with the policy environment of the recipient country. To do so, we use Burnside and Dollar (2000) and Easterly, Levine and Roodman (2003) datasets. We find that aid effectiveness is not significantly different for the two types of aid. However, when we condition on policies, we find that untied aid has a greater impact on growth than tied aid. We find that this difference is significant for the sample of low and middle-income countries, and is not statistically significant, but consistent in sign for the sub sample of low-income countries.

1 Introduction

"In general, donors have not discriminated effectively among different countries and different phases of the reform process. Donors tend to provide the same package of assistance everywhere at all times"[1]. Historically, multilateral and bilateral aid donors propose fairly standardized aid contracts, with conditionality[2] a common clause to the majority of the agreements. The clause that has introduced some heterogeneity to the aid contracts as implemented is tied versus untied aid: whether the recipient is free to decide the use of the funds received or must use the funds to buy goods and services from the donor country.

Traditionally, aid effectiveness literature considers aid as an aggregate. In their influential paper, Burnside and Dollar (2000) claim that aid has a positive impact on growth in countries with good policies. This result, quite controversial and starting point of much debate, leaves policy makers with an open question: What can be done in countries with bad policies? How should aid

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[1]Aid and Reform in Africa, World Bank 2001

[2]Conditionality has received increasing attention. For example, The World Bank (2005), Svenson (2003), Drehen (2002) evaluate the effect of conditionality on Aid effectiveness.

contracts offerings adapt to individual country characteristics to maximize their effectiveness?

Since creation of the Development Assistance Committee (DAC), an important issue arises as to whether aid recipients should be freely available to buy goods and services from all countries ("untied aid"), or should aid recipient countries be restricted to the procurement of goods and services from the donor country ("tied aid"). The DAC recommends untying Official Development Assistance to Least Developed Countries: it expects untied aid to be more efficient than tied aid due to administrative burdens and possible technical incompatibilities among donor and recipient technologies that accompany tied aid. Moreover, tied aid, sometimes qualified as a hidden subsidy to donor's national industries, arguably responds to political pressures, as opposed to recipient countries needs.

Accordingly, DAC recommendations and the aid effectiveness literature beg the following question: Which contract is more effective for each set of recipient characteristics? To examine how different recipient characteristics affect each contract's effectiveness can help to design the optimal contract for each recipient situation and improve the overall effectiveness of development assistance. Concretely, the question we pose is: Do both tied and untied aids have differential effects on growth? And how do such differential effects depend on the existence of good policy environments?

The literature on aid effectiveness is extensive, yet shows contradictory results. A well-known example is the sequence that Burnside and Dollar (2000) begin and Easterly, Levine and Roodman (2004)[3] continue, which finds opposite results as to whether aid and recipient growth are conditional on country policies, and the latter highlights the robustness problems of the former.

Apart from the robustness of the results to new data, several econometric concerns appear in cross-country aid effectiveness regressions. As examples, Hansen and Tarp (2001) show how effectiveness results are highly sensitive to the choice of the estimator and the set of control variables, while Clemens, Radelet and Bhavnani (2004) show how assistance can be separated into short- and long-term aid to use the appropriate measure to calculate aid effectiveness for each period of time. Rajan and Subramanian (2005) present a robust check of existing literature on the channels of aid effectiveness.

More on our line of estimating the effect of different types of aid, Easterly (2003) emphasizes the need to properly define a measure of assistance, and Minoiu and Reddy (2007) argue that aid should not be treated as a homogenous variable, but rather should be separated into geopolitical aid and developmental aid categories. Bobba and Powel (2007) study the ffect of the procedence of aid (from political allies or non-allies) on growth.

The structure of this paper is as follows: Section 2 presents the data, Section 3 examines the determinants of tied and untied aid, Section 4 studies the effect of the two aid contracts considered on growth, and Section 5 concludes.

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[3]Followed by Burnside and Dollar (2004) and Easterly, Levine and Roodman (2004) with reply and comments.

2   Data sources and econometric strategy

We extend the Easterly, Levine and Roodman (2004) dataset with information on tied and untied Aid from the DAC_OECD database. This data, available at www.cgdev.org, includes a panel of 70 aid recipient countries for the 1970-1997 period. We extend the Easterly, Levine and Roodman (2004) dataset using tied and untied aid data from OECD (Development Assistance Committee and Creditor Reporting System) for the given time period[4]. We follow the dataset structure using four-year averages to construct the panel. The final dataset used includes multilateral and bilateral donors, but does not include humanitarian or emergency aid.

The dataset used is chosen for comparability, as it has been used, in many of its extended versions, in the most influential extant aid effectiveness studies. First created by Burnside and Dollar (2000) to find that aid works in a good policy environment, Easterly, Levine and Roodman (2004) extend the data set one more period and fill in some missing data. They find that Burnside and Dollar (2000) results are not robust and require the use of additional data. Burnside and Dollar (2004) reply to these critiques with the argument that resultant study's differing results are driven by the new data. The introduction of tied and untied aid data to the same dataset used by Burnside and Dollar (2000) and Easterly, Levine and Roodman (2004) allows us to compare our results against previous studies and to check the robustness of our claim to the different samples.

Aid-growth cross-country regressions endogeneity problems are discussed extensively in the aid literature. Instrumental variables estimations, which treat all regressors that involve aid as endogenous, are a common approach to the problem. Burnside and Dollar (2000) introduce a set of instruments containing regional dummies, policy variables, and measures of socioeconomic stability that is followed consistently in extant literature. Hansen and Tarp (2001) extend this set of instruments to include all aid regressors lagged one period as instruments, what required GMM to estimate aid effect on growth.

Following Burnside and Dollar (2000), we create a policy index that weights policies according to their impact on growth. To construct the index, we use policy variables that include the Trade Openness Index of Sachs and Warner, inflation as a measure of monetary policy, and we use budget surplus relative to GDP as a fiscal variable

Our objective is to study the effect of two proposed aid contracts: tied and untied aid, on growth. For comparability with the literature, we follow the robustness of our results to different estimation procedures (OLS, 2SLS and the system GMM estimator proposed by Blundell and Bond (1998)).

In the instrumental variables approach, we begin with the determinants of each type of aid (first stage regression) and then use these instrumented variables to obtain the effect of each aid contract on growth. In the second stage, we check the effectiveness of tied and untied aid, individually, and then check for

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[4]An average of 20% of aid is tied, and the percentage increases in the 80's.

consistency of the results to different estimation procedures. Given the need to instrument both tied and untied aid variables, we dedicate the following section to an examination of the correct instruments for each.

Further, we proceed with the traditional 2SLS framework to check the differential effect of tied and untied aid on growth, and how policies affect this differential effect. Accordingly, we extend Burnside and Dollar's (2000) estimating equation to

$$g_{it} = y_{it}\beta_y + a_{it}^T\beta_a^T + a_{it}^T P_{it}\beta_{aP}^T + a_{it}^U\beta_a^U + a_{it}^U P_{it}\beta_{aP}^U + Z_{it}\beta_z + \varepsilon_{it}^g$$

The coefficients on untied aid and untied aid interacted with policies give us the differential effect of each aid contract on growth. Since

$$a_{it} = a_{it}^T + a_{it}^U$$

we estimate

$$g_{it} = y_{it}\beta_y + a_{it}^T(\beta_a^T - \beta_a^U) + a_{it}^T P_{it}(\beta_{aP}^T - \beta_{aP}^U) + a_{it}\beta_a^U$$
$$+ a_{it}P_{it}\beta_{aP}^U + Z_{it}\beta_z + \varepsilon_{it}^g$$
$$g_{it} = y_{it}\beta_y + a_{it}^U(\beta_a^U - \beta_a^T) + a_{it}^U P_{it}(\beta_{aP}^U - \beta_{aP}^T) + a_{it}\beta_a^T$$
$$+ a_{it}P_{it}\beta_{aP}^T + Z_{it}\beta_z + \varepsilon_{it}^g$$

where g_{it} is per capita real GDP growth, y_{it} logarithm of initial real per capita GDP, a_{it}^T and a_{it}^U are the vectors of aid receipts relative to GDP for each type of aid, P_{it} is a vector of macro policy variables, and Z_{it} is a set of exogenous variables. The first stage necessary to instrument aid (and all regressors involving aid) is given by

$$a_{it}^T = y_{it}\gamma + Z_{it}\gamma_z + a_t^T + \varepsilon_{it}^a$$

where ε_{it}^a is the vector of errors of the first stage regression. The coefficients on untied aid and untied aid interacted with policies give us the differential effect of each aid contract on growth.

3   Tied and Untied Aid

Tied aid is that which is given on the condition that the beneficiary uses it to purchase goods and services from suppliers based in the donor country. "Untie aid" therefore means to open up aid recipient purchases to suppliers in other countries in addition to the donor country[5]. The DAC has recommended untying Official Development Assistance to the Least Developed Countries. Untied aid is expected to be more efficient than tied aid due to administrative burdens and possible technical incompatibilities tied aid may create between donor and

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[5] General Development Framework, European Union (http://europa.eu.int/scadplus/leg/en/lvb/r12108.htm)

recipient country technologies. In addition, untied aid is presumably subject to fewer political pressures than tied aid creates.

Table 1 presents the first stage results for each type of aid, accounting for country-specific, fixed effects for the set of low-income countries. Following the literature, yet with further extended choice, the included instruments are: regional dummies (sub-Saharan Africa, the Franc Zone, Egypt, and central European countries), and socioeconomic variables (a measure of arms imports relative to total imports lagged one period, and policy variables, such as ethnic factorization and rate of political assassinations and their interactions).

We find that each set of variables has different effects for each type of aid. Arms imports and their interaction with policy are significant determinants of untied aid, together with social stability variables. For tied aid, significant determinants are population and initial GDP of the recipient. Poorer and more populated countries are more likely to receive greater amounts of tied aid, while more socially stable countries are more likely to receive greater amounts of untied aid. When we examine aggregate aid, we find that aid decreases with the social stability of the recipient, a pattern that follows the untied aid pattern.

As intuition tells us, each type of aid requires a different set of instruments: while tied aid is closely related to initial income and population, untied aid is sensitive to the socioeconomic situation. The choice of instruments for each type of aid differs from the common aggregate aid instrumentation debate: each specific type of aid is more closely related to recipient characteristics than the aggregate measure. This fact leaves some instruments of aggregate aid, for example colonial links, with reduced instrumentation power on the specific aid contract.

4   Aid effect on growth

To determine aid's effect on the recipient country's growth through each of the aid contracts considered- both tied and untied- we check the effectiveness of each type of contract to offer a comparison.

In Table 2, we study the effect of tied aid on growth for the entire sample of countries. We find that, for all estimation procedures, tied aid has a significantly negative effect on growth, and that this effect is independent of the policies of the recipient country. We find significant "increasing returns" on the quadratic term: as the amount of tied aid increases, its negative effect on growth decreases. No significant effect of untied aid on growth is found for the same sample of countries, given the same specifications.

Looking only at this result, we are tempted to conclude that untied aid is the optimal strategy to ensure growth in recipient countries. Table 3 presents the symmetric estimations for aggregated aid and untied aid. Last column shows that untied aid has significantly greater effect on growth than tied aid, but that the effect of interaction with policies is not statistically different.

Tables 4, 5, 6 and 7 present the random effects estimation of the aid effect on growth for the four sample specifications of Burnside and Dollar (2000). We find

that the result that tied aid has a greater impact on growth than untied aid is not sufficiently robust to the sample specification. For the low- and middle-income sample specification (including or excluding outliers), we find that the difference of coefficients is also related to policies: untied aid works better than tied aid, and the difference between the two increases as good policies of the recipient country increases. Even if this result is not robust to the sample specification, its sign is intuitive: for countries with bad policies, differential effects of the two aid contracts is considered minimal, and when policies are better, recipient country governments are able to take greater advantage of untied aid over tied aid.

To focus only on one specification leads to strong results. For example, if we look only at Table 5, we could conclude that a transfer of 1% from tied to untied aid in a good policy environment could affect growth by 4.5 points and this result is statistically significant. However, looking at the different specifications, this percentage changes from 6.2 in Table 4 to 1.6 in Table 7, but these coefficients are not significant. We can conclude that with better policies, untied aid has greater effect on growth, but this result is not statistically significant for the different sample specifications.

5   Conclusions

In this paper, we show that an intuitive claim that untied aid is more effective than tied aid is not sufficiently supported by the data. We find that, even if, for some samples of countries, untied aid has greater impact on growth than tied aid, the result is not robust. Upon data analysis, we further find that the difference in effectiveness of each contract is related to the policies of the recipient countries: the more favorable the policy environment of the recipient country, the greater the differential effect of untied aid over tied aid, on growth.

Tied aid is the subject of heated political debate and should be considered carefully. However, the results of this study suggest that tied aid may be more growth-effective than untied aid, under some circumstances. These results have important policy implications: it is not that countries with bad policies should not receive aid, since it is less effective there. Rather, poorer and less stable countries, and countries with bad policies, can make aid work in a way that effects growth, when it is offered with the appropriate contract. While tied aid receives significant political critiques, which should be considered, the results of this paper show that, in some situations, tied aid may be more effective than untied aid.

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Table 1 : **Aid Regressions with country specific (fixed) effects**

Dependent Variable:	Tied Aid	Untied Aid	All Aid
Arms imports over total imports	0.396	4.153	4.549
	(0.81)	(2.52)*	(2.76)*
Log population	0.144	0.229	0.374
	(0.05)**	(0.17)	(0.19)*
Arms * policy	-0.140	-3.43	-3.574
	(0.65)	(2.03)*	(2.22)
Ethnic fractionalization	-0.219	-1.682	-1.902
	(0.22)	(0.69)**	(0.76)**
Assasinations	0.118	-0.825	-0.706
	(0.10)	(0.33)**	(0.36)*
Ethnic * assasinations	-0.838	3.692	2.853
	(0.38)**	(1.18)**	(1.29)**
Log initial GDP per capita	-0.624	-0.292	-0.916
	(0.23)**	(0.73)	(0.80)

Sample: Low income countries, outliers excluded

Significance levels: * 10%, **5%

Std. errors in parentesis.

Regional dummies, Population and policy interactions, and institutional quality included as regressors.

Table 2 : **Growth Regressions with country specific (fixed) effects**

Estimation Method	OLS	$2SLS^1$	GMM^2
Tied Aid	-2.892	-6.885	-3.003
	(1.14)**	(3.44)**	(0.95)**
Tied Aid2	0.612	2.505	0.553
	(0.27)**	(.1.37)*	(0.26)**
Tied Aid*Policy	0.445	0.151	0.090
	(0.32)	(0.34)	(0.22)
ln(initial GDP per capita)	-0.177	-0.473	-0.284
	(0.43)	(0.45)	(0.44)
Ethnic Fractorization	-0.033	-1.867	-1.30
	(0.65)**	(1.07)*	(1.10)
Assasinations	0.073	0.202	-0.545
	(0.32)	(0.39)	(0.34)
Ethnic * Assasinations	-0.033	-0.255	0.545
	(0.65)	(0.75)	(0.78)
Institutional Quality	0.269	0.085	0.158
	(0.13)**	(0.16)	(0.16)
Policy	19.665	0.932	0.855
	(13.53)	(0.24)**	(0.21)**
R squared	0.4237	0.2264	

Dependent Variable: Annual growth rate of GDP per capita

Sample: All countries (160)

Significance levels: * 10%, **5%

Std. errors in parentesis.

Time, Sub-saharian Africa and Asia dummies were included in all regressions.

1 Instruments: Log population, Arms impots lagged one period, population-policy interactions, initial GDP-population interaction.

2 Blundell Bond (2000) Estimator, Sargan test of overidentified restrictions p-value 0.306

Table 3 : **Growth Regressions with country specific (fixed) effects**

Estimation Method	OLS		2SLS[1]		GMM[2]		GMM[2]
Aid	-0.451 (0.32)		-1.797 (0.95)**		-0.405 (0.27)		-1.153 (0.65)
Aid2	0.038 (0.03)		0.270 (0.15)		0.056 (0.03)*		
Aid*Policy	0.073 (0.12)		-0.041 (0.13)		0.062 (0.08)		0.028 (0.26)
Untied Aid		-0.383 (0.34)		-1.541 (0.96)*		-0.128 (0.30)	1.289 (0.85)*
Untied Aid2		0.057 (0.03)		0.267 (0.19)		0519 (0.03)	
Untied Aid*Policy		-0.023 (0.15)		-0.100 (0.23)		0.039 (0.12)	0.085 (0.34)
Sargan test of overidentified restrictions					0.26	0.306	0.442

Dependent Variable: Annual growth rate of GDP per capita

Sample: All countries (160)

Significance levels: * 10%, **5%

Std. errors in parentesis.

Ethnic fractorization, assasinations, institutional quality, policy, together with time, Sub-saharian Africa and Asia dummies included in all regressions.

1 Instruments: Log population, Arms impots lagged one period, population-policy interactions, initial GDP-population interaction.

2 Blundell Bond (2000) Estimator.

Table 4 : **Growth regressions with country specific (random) effects**

	(1)	(2)	(3)	(4)	(5)
Aid	1.001				-1.447
	(0.59)*				(1.57)
Tied Aid			-7.128		0.953
			(3.14)*		(9.09)
Untied Aid		-1.096			
		(0.72)			
Aid*Policies	0.562				1.794
	(0.19)**				(0.86)**
Tied Aid*Policies			3.031	-3.341	-6.284
			(1.13)**	(2.39)	(5.25)
Untied Aid*Policies		0.687		1.131	
		(0.23)**		(0.54)**	
R squared	0.3694	0.3736	0.3316	0.2964	0.2377

Dependent Variable: Annual growth rate of GDP per capita

Sample: Low and Middle Income countries, Outliers excluded, 268 observations

Significance levels: * 10%, **5%

Std. errors in parentesis.

Regressors: Ethnic fractiorization, assasinations, regional dummies, institutional quality measure, M2/GDP, initial GDP per capita, and interactions.

Table 5　: **Growth regressions with country specific (random) effects**

	(1)	(2)	(3)	(4)	(5)
Aid	-0.082 (0.35)				-0.631 (1.02)
Tied Aid			-0.193 (1.25)		-0.935 (3.70)
Untied Aid		-0.143 (0.48)			
Aid*Policies	0.1 (0.09)**				1.434 (0.61)**
Tied Aid*Policies			0.186 (0.29)	-1.342 (0.85)*	-4.511 (2.07)**
Untied Aid*Policies		0.165 (0.13)		0.673 (0.39)*	
R squared	0.3642	0.3652	0.3629	0.3627	0.2385

Dependent Variable: Annual growth rate of GDP per capita

Sample: Low and Middle Income countries, 274 observations

Significance levels: * 10%, **5%

Std. errors in parentesis.

Regressors: Ethnic fractiorization, assasinations, regional dummies, institutional quality measure, M2/GDP, initial GDP per capita, and interactions.

Table 6 : **Growth regressions with country specific (random) effects**

	(1)	(2)	(3)	(4)	(5)
Aid	-1.001				-0.681
	(0.57)*				(1.04)
Tied Aid			-9.037		-2.633
			(5.38)*		(9.36)
Untied Aid		-0.1050			
		(0.64)*			
Aid*Policies	0.559				0.974
	(0.24)**				(0.86)
Tied Aid*Policies			4.588	-3.593	-2.306
			(2.77)*	(3.57)	(7.01)
Untied Aid*Policies		0.622		0.864	
		(0.27)**		(0.65)	
R squared	0.4593	0.4622	0.3475	0.3408	0.4043

Dependent Variable: Annual growth rate of GDP per capita

Sample: Low income countries, Outliers excluded, 178 observations

Significance levels: * 10%, **5%

Std. errors in parentesis.

Regressors: Ethnic fractiorization, assasinations, regional dummies, institutional quality measure, M2/GDP, initial GDP per capita, and interactions.

Table 7 : **Growth regressions with country specific (random) effects**

	(1)	(2)	(3)	(4)	(5)
Aid	0.038				-0.640
	(0.29)				(0.68)
Tied Aid			0.192		1.251
			(1.01)		(2.43)
Untied Aid		-0.103			
		(0.72)			
Aid*Policies	-1.011				0.509
	(0.10)				(0.67)
Tied Aid*Policies			-0.104	-0.447	-1.621
			(0.29)	(0.76)	(2.07)
Untied Aid*Policies		0.004		0.169	
		(0.15)		(0.37)	
R squared	0.4747	0.4724	0.477	0.4824	0.4651

Dependent Variable: Annual growth rate of GDP per capita

Sample: Low income countries, 183 observations

Significance levels: * 10%, **5%

Std. errors in parentesis.

Regressors: Ethnic fractiorization, assasinations, regional dummies, institutional quality measure, M2/GDP, initial GDP per capita, and interactions.