



2015

### Is All Foreign Aid the Same? : An Empirical Comparison of the Effect of Multilateral and Bilateral Aid on Growth

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#### Recommended Citation

Jeffrey, Scott B. (2015) "Is All Foreign Aid the Same? : An Empirical Comparison of the Effect of Multilateral and Bilateral Aid on Growth," *Undergraduate Economic Review*: Vol. 12 : Iss. 1 , Article 3.

Available at: <https://digitalcommons.iwu.edu/uer/vol12/iss1/3>

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# Is All Foreign Aid the Same? : An Empirical Comparison of the Effect of Multilateral and Bilateral Aid on Growth

## Abstract

Despite decades of research on foreign aid, there is little to no consensus on foreign aid's effect on growth. While most in the field study recipient country characteristics, such as institutional quality, this paper also breaks down foreign aid by donor characteristics, specifically by bilateral and multilateral donors. Since about 75% of foreign aid is bilateral, my bilateral findings are in line with previous literature that finds high institutional quality key (Burnside and Dollar 2000; 2004), but I find that multilateral aid works best in low-income countries with poor policy environments, due, perhaps, to lacking political goals of donor countries.

## Keywords

Bilateral, Multilateral, Foreign Aid, Growth, Institutions

## Cover Page Footnote

I would like to thank Dr. Shyam Gouri Suresh of Davidson College for his insights, assistance and motivation throughout my research process.

## INTRODUCTION

The United States spent about \$27.5 Billion on non-military foreign aid in 2011. One would think that through this staggering amount of funds, the U.S. could expect recipient countries to exhibit signs of economic growth from the aid. Yet it is unclear how, if at all, aid impacts country's growth rates.

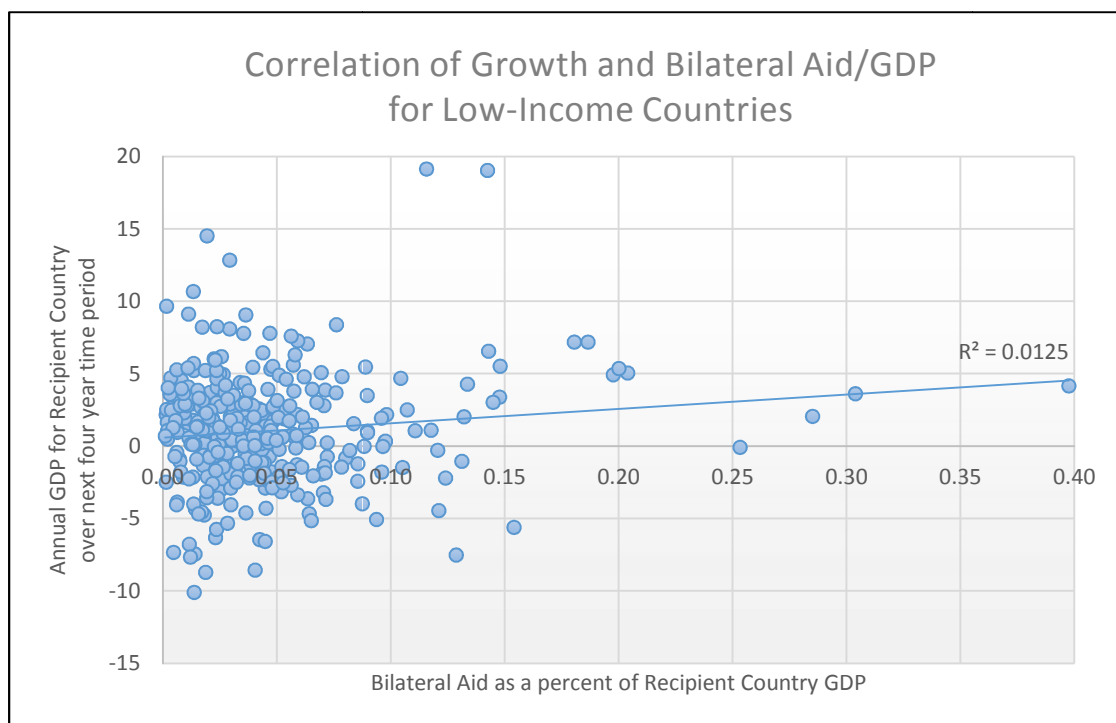
The effectiveness of foreign aid is a densely studied area. An examination of the literature on aid effectiveness provides mixed results. Hansen and Tarp (2000) conducted a meta-analysis of literature on the effect of foreign aid on macroeconomic growth. Literature on this topic spans back to the 1960s, with the first relationship observed between aid and growth focusing on savings and investment. Most evidence found that savings and investment in developing countries rose as foreign aid came into the country, resulting in growth. Hansen and Tarp recognize that savings and investment represent the first two generations in explaining the effect of aid on growth, but that the third generation of studying this effect through the lens of policy is "a distinct step forward in empirical cross-country work on aid effectiveness." Many models (e.g. Durberry et al. 1998) found a nonlinear trend; there is a positive effect of aid on growth, but with diminishing returns. However, the most influential literature to examine the effect of aid on growth via policy comes from Burnside and Dollar (2000), who find that aid has no effect on growth, unless the aid is given to a country with a good policy environment, specifically low inflation, high budget surplus and an open economy. The authors find that only under a good policy environment will aid cause growth. The implications of Burnside and Dollar's conclusions did not fall on deaf ears. Their finding has been cited, either explicitly or implicitly, by *The Economist*, the *New Yorker*, *The Financial Times*, the president of the World Bank at the time, James Wolfensohn, and the president of the United States at the time, George W. Bush, as he announced a \$5 Billion increase in foreign aid from the U.S. (Easterly 2003).

Though influential, Burnside and Dollar's results have not been universally accepted. Easterly, Levine and Roodman (2003) mimic Burnside and Dollar's procedure using newer data, and find the previous authors' influential result is not robust. Easterly (2003) goes a step further, saying that by making changes to data sources of aid, definitions of good policy *or* measurements of economic growth, the Burnside and Dollar result fails to hold. Alvi et al. (2008) use a semiparametric model with the same variables that Burnside and Dollar use to find the relationship between aid policy and growth, and come to results that partially support Burnside and Dollar. The authors find that aid fails to encourage economic growth below a certain policy threshold, and that aid is more effective in good policy environments, but there are diminishing returns to how policy helps aid spur growth.

Much research has been done on the relationship between aid, policy and growth, with some claiming better policy environments leads to more effective aid, others refuting this claim, while still others find a more complex relationship. Radelet (2006) reviews the literature surrounding the conditional relationship of policy and how it changes aid's effect on growth. Most of the studies have focused on a condition of the recipient country's characteristics. These provide mixed results based on the characteristics. Again, the Burnside and Dollar results regarding the policy environment are debated, but recipient country characteristics have been extensively studied as a channel for aid to cause growth. Radelet also finds that the sector that the aid is targeted towards will change foreign aid's effect on growth. Notable sectors that alter

the effect of aid on growth are emergency and humanitarian aid—which decreases the effect of foreign aid on growth due to the large negative economic shocks that often spur the influx of emergency aid—and agricultural aid—which increases the effect of foreign aid on growth (Kaya et al. 2012).

While many studies have explored the relationship between foreign aid and recipient country characteristics or the sectorial target of the aid, a notable hole remains in the literature on donor practices. There are several different types of donor practices that could change how aid is allocated and the effect the aid has on growth. For example the effect of foreign aid on growth could change whether a country chooses to donate aid bilaterally, from country to country, or multilaterally, donating to an international organization that focuses on promoting growth. Radelet, writing for the Center for Global Development, discusses this hypothesis and the lack of literature available: “multilateral aid might be more effective than bilateral aid, and ‘untied’ aid is thought to have higher returns than ‘tied’ aid...[b]ut to date there has been very little systematic research connecting specific donor practices to aid effectiveness.” In this paper I will address the question, what are the differences between the empirical effects of bilateral aid and multilateral aid on growth?



*Figure 1: Correlation of Growth and Bilateral Aid as a percent of GDP.*

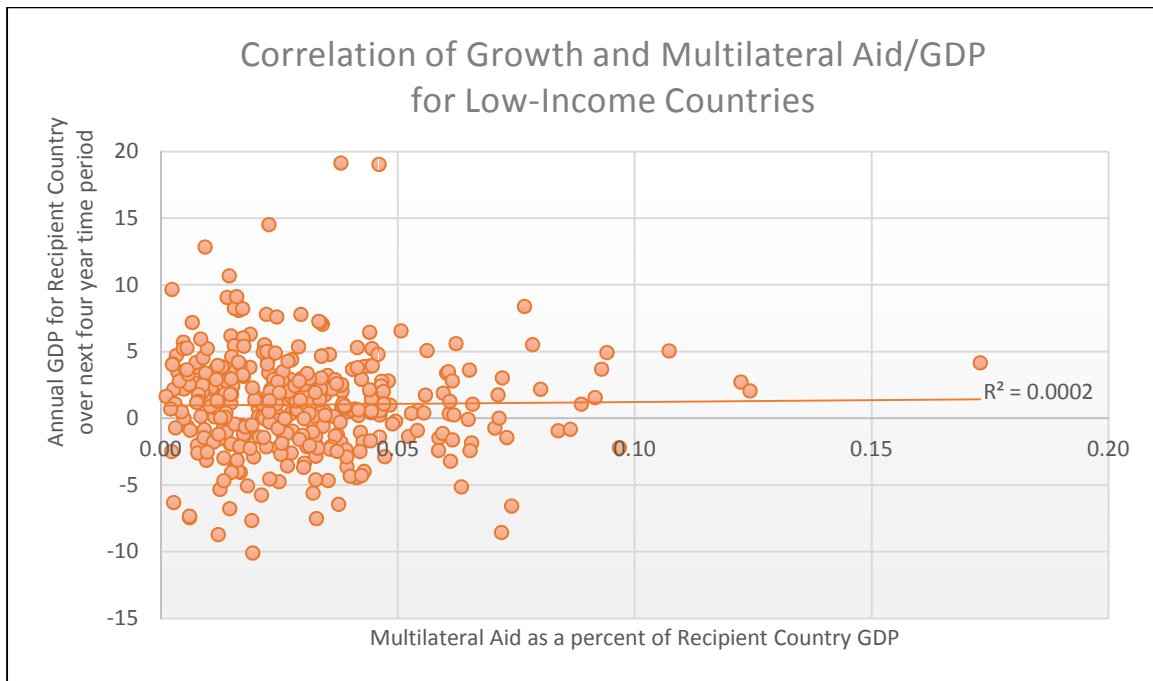


Figure 2: Correlation of Growth and Multilateral Aid as a percent of GDP.

Researching the effects of growth from bilateral aid and multilateral aid would be helpful in determining how, if at all, the two forms of aid differ for aid effectiveness. Figures 1 and 2 display the correlations for bilateral or multilateral aid and growth over a four year time period. The two correlations are strikingly similar, and there is no reason, *a priori*, to believe the two effects on growth from bilateral and multilateral aid should differ. However, when reviewing Alesina and Dollar (2000), it's clear that the distribution of bilateral aid comes from political factors such as colonial past, or how often countries vote together in the U.N. These authors find that economic policies are not driving bilateral aid. Coupled with Burnside and Dollar's less famous finding in their influential 2000 article, that good economic policy is partially driving multilateral aid (especially aid from the World Bank) but not bilateral aid, it seems that donors—as broad as distinguishing at the level of bilateral donors and multilateral donors—have different goals when providing aid. Radelet (2006) addresses a similar point of donor strategies and how they are different between bilateral and multilateral aid: “Bilateral aid is often designed at least partially to help support the economic interests of certain firms or sectors in the donor country. Multilateral aid is less prone to these pressures, although by no means immune.” Due to political motivations for sending aid, donor countries that send aid may not strive to create growth in recipient countries as much as multilateral organizations do. However, there are several reasons why multilateral aid might differ from bilateral aid in terms of their effects on growth, so finding any empirical difference from their effects on growth cannot be attributed directly to politically-motivated distributions, but understanding the effects of different types of aid can help shape policymakers decisions when choosing how to allocate aid—whether in the name of growth or political strategy. I'm interested in empirically testing if one type of aid—bilateral or multilateral—is more effective than another because the motivation for providing aid makes that seem possible, if not likely.

## MODEL DEVELOPMENT

I will attempt to answer my question using an empirical model of bilateral and multilateral aid on growth. However, to verify and compare my results to other results within the literature, I'm also interested in the effect of total aid on growth, which I will estimate as model (1). Model (2) will estimate the effect of bilateral and multilateral on growth.

$$g_{i,t} = y_{i,t}\beta_y + a_{i,t}\beta_a + \mathbf{p}_{i,t}\beta_p + a_{i,t}\mathbf{p}_{i,t}\beta_{ap} + \mathbf{z}_{i,t}\beta_z + g_t + \varepsilon_{i,t}^g \quad (1)$$

$$g_{i,t} = y_{i,t}\beta_y + b_{i,t}\beta_b + m_{i,t}\beta_m + \mathbf{p}_{i,t}\beta_p + b_{i,t}\mathbf{p}_{i,t}\beta_{bp} + m_{i,t}\mathbf{p}_{i,t}\beta_{mp} + \mathbf{z}_{i,t}\beta_z + g_t + \varepsilon_{i,t}^g \quad (2)$$

The first model is the exact same structure as the model that Burnside and Dollar estimate (2000). The only difference between equations (1) and (2) is that every instance of  $a$ , which represents total aid per GDP, is replaced with both  $b$ , which represents bilateral aid per GDP, and  $m$ , for multilateral aid per GDP. The following apply to both models:  $g$  represents growth rate,  $y$  is the logged initial GDP per capita,  $\mathbf{p}$  is a policy vector,  $\mathbf{z}$  is a vector of other exogenous variables,  $g_t$  represents the fixed time effect and  $\varepsilon_{i,t}^g$  is the error term for growth.

I do not include an estimate of aid as a function of growth, as Burnside and Dollar (2000) estimate this equation via 2SLS, and find “no significant tendency for total aid or bilateral aid to favor good policy.” Considering their main finding that aid only promotes growth with good policy, if aid is not driven by the policy environment of recipient countries, then aid is not driven by growth. This notion is in accordance with Alesina and Dollar (2000) who estimate aid as a function of many different political variables, but not growth.

## Variables

While I base my model structurally off of Burnside and Dollar's, I change which variables I include within my model to incorporate criticism of certain variables and decisions from Burnside and Dollar. For those variables I will discuss which changes I'm making and why. The first variable in the models is logged initial GDP per capita. It's important to include an initial GDP statistic when capturing growth of GDP, and logging initial GDP per capita, as per previous literature, will help scale the statistic. All three types of aid—total aid (TAID), bilateral aid (BLAID), and multilateral aid (MLAID)—are all a ratio, taking the aid received and dividing by total GDP. While total aid truly includes private contributions, in addition to bilateral and multilateral aid, I calculate total aid by summing bilateral and multilateral aid. Since humanitarian and emergency aid has been shown to be endogenous with poor growth (Radelet 2006), I exclude these types of aid from the regression, as I try to focus on aid that aims to promote growth. These aid figures do not include military spending.

The policy variables included in the policy vector are openness, inflation and Polity2 scores. While Burnside and Dollar used the Sachs and Warner dummy variable for openness, which assigns an economy as closed if it meets one of five criteria, Rodriguez (2006) raises legitimate criticisms against the seemingly arbitrary dummy variable. For this reason, I use a different measure of openness, a continuous variable that measures a country's exports plus imports divided by GDP. In addition to inflation, I use Polity2 scores as a measure of governance quality. I add 11 to the Polity2 scores to keep all values positive (Ahmed 2012). I do not include budget

surplus—originally included in Burnside and Dollar's policy vector—for theoretical reasons. Maintaining a budget surplus is not necessarily associated with good policy and growth, a lesson reinforced by the deficit spending necessary to spur growth, or at least prevent further decline, during the recent recession. Additionally, I am including the beginning of the global recession (the data runs up to 2009) in my analysis, so I have excluded budget surplus from my model.

All three variables in the policy vector will be interacted with aid. Unlike Burnside and Dollar (2000), I will not construct a policy index. Many have disputed the results of the effectiveness of a policy index (Dalggaard and Hansen 2001; Easterly, Levine and Rodman 2003), and more recent foreign aid papers abandon the policy index altogether (Burnside and Dollar 2004; Sharma and Bhattarai 2013). I choose to interact aid with Polity2 scores, or the institutional quality measure, for theoretical reasons—aid should be more effective for growth in countries with better institutions that promote rule of law and democracy—and also to align with literature. While Burnside and Dollar (2000) do not interact aid with institutional quality, as it is not an “economic policy” variable, the same authors create the interaction term in their later paper on the same topic (2004).

Other variables that fall into the exogenous variable vector,  $\mathbf{z}$ , include ethnic fractionalization, political instability, the interaction between ethnic fractionalization and political instability, and two regional dummy variables for sub-Saharan Africa and East Asia. Ethnic fractionalization is the measure of how divided the country is ethnically. For my measure of political instability, I use a measure from the Political Instability Task Force which averages three scaled values: number of rebel combatants or activists, number of fatalities related to fighting, and portion of country affected by fighting. By averaging these three values, I can establish a sense of country-wide political instability more thoroughly than the number of assassinations in a country—the common measure of political instability.

Variable	Full Sample				Low Income Sample			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Growth (rGDPpc)	1.695884	4.072794	-28.9197	19.34739	1.016566	3.999486	-28.9197	19.14354
Initial GDPpc (Logged)	7.736266	0.9911436	5.348895	10.22795	6.812112	0.44201	5.348895	7.549487
Ethnic Fractionalization	0.496963	0.2622008	0	0.930175	0.609954	0.2564615	0	0.930175
Political Instability	0.191463	0.8059154	0	9	0.224763	0.7661768	0	6.3882
Sub-Saharan Africa	0.42439	0.4945518	0	1	0.761518	0.4267342	0	1
EastAsia	0.035366	0.1848155	0	1	0.00813	0.0899216	0	1
Openness	70.83179	37.72763	1.826577	233.8419	54.05857	31.72176	1.826577	177.9717
Inflation	13.77786	358.1694	-27.5642	10254.57	0.588876	9.974843	-24.8001	80.72468
Polity2 Score	10.91372	6.13612	1	21	9.088076	5.410842	1	20
Bilateral Aid / GDP	0.030009	0.0371024	0.001002	0.397507	0.044909	0.0449158	0.001002	0.397507
Multilateral Aid / GDP	0.021242	0.0190696	0.001029	0.172921	0.030188	0.0219923	0.001097	0.172921
Total Aid / GDP	0.05125	0.0513674	0.002098	0.570428	0.075096	0.0612178	0.002987	0.570428

*Table 1: Summary Statistics of all non-interacted variables, split between the two samples used. There are 120 countries and 820 observations in the full sample and 53 countries and 369 observations in the low income sample.*

## Summary Statistics

The summary statistics are displayed in figure 1. Observations run from 1974 to 2009. Similar to most recent foreign aid research, I use four year time periods for my observations so that any growth that occurs via aid has some time to manifest. I include a low-income sample based on observations with logged initial GDP per capita below 7.55—or initial GDP per capita below \$1900—which is an arbitrary cutoff, but used by several authors in past foreign aid literature. This can include certain time periods of a given country, but not others if the country exceeds a GDP of \$1900 per person between 1974 and 2009. While small samples often served as a problem for foreign aid literature, especially when narrowing the sample size to low income countries, expanding the data up to 2009 helps, as there are 820 observations in the full sample and 369 observations in the low income sample.

As I'm trying to answer a similar question to Burnside and Dollar (2000), I would like to have comparable data, so when I look at the summary statistics I'm encouraged to see similar preliminary data for growth, but not for aid. The mean of my GDP growth for the full sample is larger than theirs, (1.69 to 1.2) but the mean GDP growth for the low income sample is much closer to their value (1.01 to 1.1). My total aid / GDP figure should match up with their Aid (percent of GDP) figure, but because my values are in 2005 US dollars and their values are in 1985 US dollars, I first use deflator indices from the Bureau of Economic Analysis. However, even after adjustment, my mean total aid figures are about twice as much as those of Burnside and Dollar. After checking figures for the years that are in my dataset but not Burnside and Dollar's, I find that mean aid per GDP actually decreases after 1993 (from 0.0546 to 0.0477 for the full sample). I assume the differences in our aid figures come from differences in data sources.

## Data Sources

I chose Aiddata.org as my source for aid figures based on their extensive collection of data on aid including \$6 Trillion of tracked aid, as well as the ability to sort aid between bilateral data and multilateral data. Aiddata.org is a database of international aid operated by the College of William and Mary, Brigham Young University and Development Gateway, a non-profit development organization. While I remove all humanitarian or emergency aid data from my datasets, not every aid project has a sector code, meaning some unlabeled humanitarian or emergency aid might exist in my data.

My values for growth, initial GDP, openness and inflation all come from the Penn World Tables (version 7.1), an established source of cross-country economic data. Openness is defined as exports plus imports divided by GDP, as opposed to the commonly used, but controversial, Sachs-Warner dummy variable for openness. Inflation comes from consumer price levels. All values are in constant 2005 US dollars.

My fractionalization data comes from Alesina et al. (2003). While I have ethnic fractionalization data for each country, I only have it for one year, so due to data limitations I use one year's ethnic fractionalization for all time periods under the assumption that major ethnic changes in a country's population take much longer than the time period I'm observing in my sample. Finally, data for political instability come from the Political Instability Task Force, a

group of scholars hosted by the Center for Global Policy at George Mason University dedicated to “assessing countries’ prospects for major political change.”

## RESULTS

I estimate model (1) using OLS, for both the full sample and the low-income sample. While my main question will be answered with model (2), as that model breaks up aid into bilateral and multilateral aid, I include model (1) to compare results to past literature. I have a large enough sample size to correct for heteroskedasticity, using the Huber-White method. This makes my standard errors robust, without changing the coefficients for my estimates. Based on the results from Table 2 and 3, I ran a Chow test and found that the coefficients between the two models are statistically different from one another.

For my first model, I find neither in the full sample nor the low-income sample total aid’s uninteracted coefficient significant. This is consistent with almost all prior literature, as the interactions—as well as data sources, definitions and measurements—have become the crux of foreign aid studies. My policy vector of inflation, openness and Polity2 score found only inflation to be significant, and for both samples. Openness, and the interaction between openness and aid, is never found to be significant in my models. When interacting the policy vector with total aid, the Polity2 and inflation interactions became significant but only in the full sample. This ambiguity for the interaction terms is consistent with the body of literature as a whole. While Burnside and Dollar (2000) find evidence that their interaction of aid and policy is positive and significant, Easterly Levine and Roodman (2003) run the same regression, but simply expand Burnside and Dollar’s dataset, and find no relationship between aid and policy in an exhaustive list of regressions. I will find no meaning in comparing the numerical values, as their measure of institutional quality comes from Knack and Keefer (1995) and their single year measure of each country’s efficiency of government bureaucracy, while I use Polity2 scores, intended to measure the overall quality of governance in a country. Based on these mixed results from the first model, it is difficult to determine total aid’s effect on growth in middle and low income countries or even just low income countries, a theme similar throughout the literature.

Breaking aid up into bilateral aid and multilateral aid should reveal whether donor countries, and their politically motivated dispersion of aid, impact growth via aid in a different manner than multilateral organizations. These results are in Table 3. The only instance of the coefficient for aid becoming significant is multilateral aid for the low income country sample. I test for the significance of  $\delta\text{Multilateral Aid}/\delta\text{Growth}$  at mean levels of inflation and openness in the Analysis section below.

The policy vector interacted with bilateral and multilateral aid yields mixed and interesting results. The openness interaction terms are not significant, but inflation and Polity2 scores interacted with the two kinds of aid are. Inflation’s interaction term shows that for middle and low income countries, a 1 percentage point increase in inflation on average causes the effect of bilateral aid on growth to decrease by 1.516 percentage points. The interaction term for Polity2 reveals a one point increase in governance quality (on a 21 point scale) for middle and low income countries, increases the effect of bilateral aid on growth by 2.162 percentage points on average. These two interaction terms, when understood together, tell a similar story to that of Burnside and Dollar, but for bilateral aid instead of total aid; bilateral aid is more effective at

spurring growth when institutions are good and when inflation is low. For the low-income sample, both bilateral interaction terms lose significance, and the multilateral interaction terms, again for inflation and Polity2 scores, gain them. Furthermore, for multilateral aid, the signs for these two interaction terms are opposite to what they are for the bilateral interaction terms. For example, multilateral aid interacted with inflation yields a positive value, meaning that as inflation increases one percentage point, multilateral aid's effect on growth increases 2.217 percentage points. Polity2 scores interacted with multilateral aid are negative, meaning a point increase in a country's Polity2 score results in a decline of 4.557 percentage. This is an intriguing finding, and one that deserves greater scrutiny.

The significant results of variables in my other exogenous variable vector mostly have signs that are expected. The regional dummy variables are consistent with previous literature. East Asian countries grow faster on average when compared to other countries, and Sub-Saharan African nations grow slower on average compared to other countries. The positive values for initial GDP for the full sample regressions, but not the low income samples, go against Solow's theory for growth, specifically that higher initial GDP should negatively impact growth due to catch-up growth and convergence. One reason I see positive and significant values for initial GDP's effect on growth could be due to poverty traps. Countries in the low income sample have a mean polity2 score of 9.08, compared to the full sample size which includes middle income countries, bringing the polity2 score up to 10.91. The score of 9.08 describes the average governance quality for countries in the low income sample as anocracies, where power is spread among and fought over several elite ruling parties. If the average government in this sample is best described as an anocracy (and closer on the Polity scale to autocracy than to democracy), then a poverty trap would be feasible. While my measure of political instability seems to show positive effects on growth, the interaction between political instability and ethnic fractionalization is negative, showing that the more ethnic fractionalization increases, the effect of political instability falls.

**Table 2: OLS Growth Regressions for Total Aid**

	Full Sample	Low Income
Variable	(1)	(1)
<b>Initial GDP (Logged)</b>	0.494** (0.242)	0.806 (0.817)
<b>Ethnic Fractionalization</b>	-0.460 (0.668)	1.331 (1.057)
<b>Political Instability</b>	1.130 (0.710)	1.315* (0.701)
<b>Ethnic Fractionalization *</b>	-1.827* (1.028)	-2.166** (1.007)
<b>Sub-Saharan Africa</b>	-0.470 (.395)	-2.238*** (0.651)
<b>East Asia</b>	1.806*** (0.661)	3.588*** (1.346)
<b>Openness</b>	0.003 (0.006)	0.001 (0.008)
<b>Inflation</b>	0.013*** (0.004)	-0.093*** (0.022)
<b>Polity2 Score</b>	-0.045 (0.035)	0.006 (0.051)
<b>Total Aid</b>	-5.814 (6.454)	9.394 (7.398)
<b>Total Aid * Openness</b>	-0.021 (0.059)	-0.006 (0.062)
<b>Total Aid * Inflation</b>	0.796*** (0.258)	0.190 (0.319)
<b>Total Aid * Polity2 Score</b>	0.988** (0.468)	0.020 (0.582)
<b>Other Statistics</b>		
Observations	820	369
R <sup>2</sup>	0.068	0.147

**Notes:**

Numbers in parentheses are Huber-White heteroskedasticity-corrected standard errors. Variable descriptions are given in the variables section of the text. Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) levels.

**Table 3: OLS Growth Regressions for Bilateral and Multilateral Aid**

Variable	Full Sample (2)	Low Income (2)
<b>Initial GDP (Logged)</b>	0.523** (0.247)	0.697 (0.842)
<b>Ethnic Fractionalization</b>	-0.417 (0.665)	1.095 (0.996)
<b>Political Instability</b>	1.169 (0.725)	1.266* (0.736)
<b>Ethnic Fractionalization * Political Instability</b>	-1.869* (1.047)	-2.092** (1.051)
<b>Sub-Saharan Africa</b>	-0.498 (0.400)	-2.025*** (0.646)
<b>East Asia</b>	1.795*** (0.667)	3.838*** (1.365)
<b>Openness</b>	0.001 (0.006)	0.004 (0.009)
<b>Inflation</b>	0.002 (0.009)	-0.111*** (0.026)
<b>Polity2 Score</b>	-0.037 (0.038)	0.036 (0.057)
<b>Bilateral Aid</b>	-8.307 (10.320)	-11.389 (11.571)
<b>Multilateral Aid</b>	-2.181 (20.646)	47.583** (22.399)
<b>Bilateral Aid * Openness</b>	-0.156 (0.121)	0.000 (0.186)
<b>Multilateral Aid * Openness</b>	0.229 (0.222)	-0.090 (0.314)
<b>Bilateral Aid * Inflation</b>	-1.516** (0.708)	-0.742 (0.509)
<b>Multilateral Aid * Inflation</b>	0.929 (1.421)	2.217* (1.190)
<b>Bilateral Aid * Polity2 Score</b>	2.162** (0.997)	2.395 (1.455)
<b>Multilateral Aid * Polity2 Score</b>	-1.022 (1.834)	-4.557* (2.410)
<b>Other Statistics</b>		
Observations	820	369
R <sup>2</sup>	0.073	0.162

**Notes:**

Numbers in parentheses are Huber-White heteroskedasticity-corrected standard errors. Variable descriptions are given in the variables section of the text. Stars indicate significance at 10% (\*), 5% (\*\*) and 1% (\*\*\*) levels.

## ANALYSIS

With my results, I attempt to answer my initial question: what are the differences between the empirical effects of bilateral aid and multilateral aid on growth?

In table 3, the only significant coefficient for a type of non-interacted aid was multilateral aid, and only in a low income country sample. However, this doesn't mean that this is the only instance of aid having a significant effect on growth due to the interaction terms I've included. To find aid's effect on growth at mean levels of policy, I need to estimate:

$$\frac{\delta Growth}{\delta Multilateral Aid} = \beta_m + \bar{O} * \beta_{O,m} + \bar{I} * \beta_{I,m} + \bar{P} * \beta_{P,m} \quad (3)$$

Where  $\beta_m$  is the coefficient for non-interacted multilateral aid,  $\beta_{O,m}$  is the coefficient for openness interacted with multilateral aid and so on for the two other variables in the policy vector. I'm interested in seeing how the effect of aid on growth changes as variables in the policy vector change. To choose the policy variable to change, I considered each one separately. Openness was never found impactful or significant for its effect on aid. Inflation is difficult to examine, because a good level of inflation is small and positive, but poorly governed countries had hyperinflation (10254% is the maximum) as well as deflation (-27% is the minimum) in certain time periods. Polity2 scores are straightforward in that an increase in score leads to better policy, unlike inflation, and its interaction with aid is significant, unlike openness.

I am interested in using mean levels of inflation and openness to estimate values of aid's effect on growth and all levels of Polity2 scores, as well as determine if they're statistically significant or not. In Figure 1, I graph bilateral, multilateral and total aid for the full sample, as well as the low income sample to see how the overall effect of that specific type of aid changes with institutional quality, and if the effect is significant or not.

After plotting all six combinations of aid's effect on growth from my data, I see notable trends, but assigning significance to them remains a problem for some trends. I plot the marginal effects as well as 95% confidence intervals, based on calculated standard errors, to see if the effects are statistically different from zero. The confidence intervals allow me to determine that half of these plots-- total aid for low income countries, and multilateral aid for both samples—never have significance at the 5% level. Despite their lack of significance, both of the multilateral aid plots show that as institutional quality increases, there is a declining effect of aid on growth at mean levels of openness and inflation. In fact, for the low-income sample, this negative slope is significant, as seen in Table 3 for the interaction term between Polity2 score and multilateral aid.

Both bilateral aid plots have sections that are significantly different from zero at the 5% level. The low income sample shows that at high levels (15 to 20) of Polity2 scores, or institutional quality, and mean levels of inflation and openness the effect of bilateral aid on growth is positive and statistically significant. This result is in stride with many findings, especially Burnside and Dollar (2004) who interact aid with institutional quality, as opposed to their previous interaction with their policy vector, and find aid only promotes growth in the presence of good institutions. In the full sample, from the lowest Polity2 score, 1, up to a score of 9, the effect of bilateral aid on growth is negative. This finding is a mirror to the results of

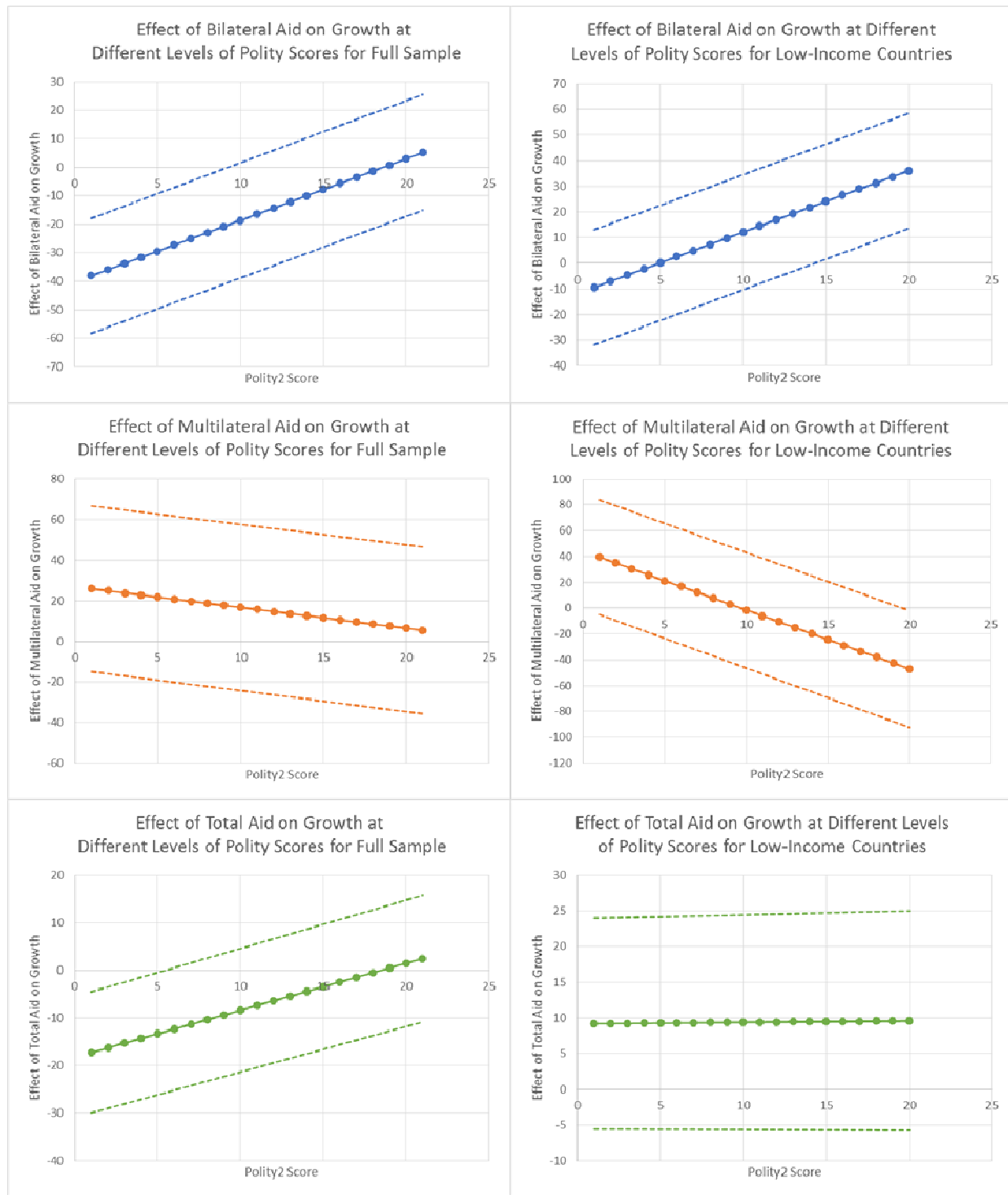


Figure 3: All six graphs of the marginal effect of aid on growth at different levels of Polity scores with confidence intervals (95%) in dashed lines.

Burnside and Dollar (2000); instead of aid having a positive effect in a good policy environment, my full sample finding shows that in a bad policy environment—from Polity2 scores ranging from 1 to 9, and with mean openness and inflation levels—bilateral aid has a negative and statistically significant effect on growth. The change in sign for significant areas of bilateral aid between the full sample and low income sample can possibly be explained by the higher mean rates of growth in the full sample (1.69) than the low income sample (1.01).

## CONCLUSIONS

The effect of foreign aid on growth has been extensively researched, but with little, if any, consensus. One area in this field that lacks research is differentiating aid between donor practices (Radelet 2006). I examine the differences between bilateral and multilateral aid, specifically their effect on growth, by combining influential papers on aid and the critiques levied against them.

I find evidence that among low income countries, bilateral aid behaves in a similar manner to what Burnside and Dollar (2000, 2004) find; specifically, at high levels of institutional quality, bilateral aid causes growth. However, at low to medium levels, the impact of bilateral aid on growth is not statistically different from zero. For multilateral aid, there was no level of institutional quality where aid became statistically significant. Yet the signs of the policy variables, inflation and institutional quality, which are interacted with multilateral aid, are significant and opposite of those signs for the variables when interacted with bilateral aid. This means that the “good policy environment” that spurs bilateral aid’s effectiveness also significantly hurts multilateral aid’s effectiveness. My finding suggests multilateral aid spurs growth despite, and because of, poor policy environments. This result can perhaps be explained by Radelet’s insights that multilateral aid’s impact on growth does not suffer by having to meet political goals of the donor country, although a more rigorous test on this hypothesis is needed.

These results are not without criticism though. By failing to choose a dataset that can sort on tied versus untied aid, I’m missing a part of the story of how donor practices change aid effectiveness. Also non-core aid, which is funded by bilateral donors and dispersed by multilateral organizations, could skew results based on how much of the non-core aid is calculated into these datasets. Furthermore, the quantity of aid that is tied, and the ability of those tied aid locations to create growth are key to analyzing the true impact of aid. In my study, since I cannot distinguish between the growth-creating abilities of firms or sectors that receive tied aid, I am forced to assume it is similar to locations that receive untied aid.

Further research is necessary on foreign aid, although instead of focusing on country characteristics—as the literature often does—new research should be carried out that analyzes the impact of donor practices. After all, when trying to lift populations out of poverty, and spur growth in developing countries, there are many facets that can determine how effective the aid will be. The quantity of money given obviously matters, the environment that the money will be used in matters, but also the quality of the aid. If the aid is tied to specific methods of spending that do not spur growth, or if the aid is given by an organization that cares more about its own political gains rather than developmental gains, then that quality of aid is low. These are the considerations that are omitted from current foreign aid research, and while I have attempted to answer that question, with respect to bilateral and multilateral donors, more must be done to paint a clearer picture of donor practices and their impact on aid effectiveness.

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