

# Aid, Growth, and Conflict\*

Francisco A. Gallego<sup>†</sup>      Loris Rubini<sup>‡</sup>      José I. Batlle<sup>§</sup>

WORK IN PROGRESS – PLEASE DO NOT CIRCULATE

## Abstract

This paper re-examines the effects of foreign aid on growth theoretically and empirically, with a new perspective: that a third variable, conflict, is key to understand the relationship. While aid may be originally intended to increase growth rates by making investment more enticing, in countries with poor institutional frameworks aid may stir up conflict, reducing the growth rate. We build a model that incorporates these features, and show that the effect of aid on growth depends crucially on the institutional framework: when institutions are strong, aid increases growth; but when institutions are weak, aid enhances conflict, potentially reducing growth rates. The empirical analysis investigates these predictions. To address the potential endogeneity of aid, we exploit a new instrumental variable, along the lines of the Card (2001) instrument for immigration, where aid flows to one country in a specific year depend on aid granted to all countries that year and the average share of total aid received by each country in all periods. Our empirical findings confirm our theoretical predictions: (1) aid increases growth only when institutions are strong, otherwise, aid deters growth and (2) aid increases conflict only when institutions are weak, otherwise, aid deters conflict. The effects are economically relevant: increasing the ratio of aid to GDP by 1% reduces the growth rate by about 0.11% in a country with weak institutions like Congo. The same shock increases growth by about 0.18% in a country with stronger institutions like Egypt. Conflict behaves similarly. These findings shed light on why previous research fails at finding links between aid and growth: the relationship can be positive or negative, depending on how conflict reacts in the recipient country.

*JEL classification:* O11, O43

*Keywords:* aid and growth, aid and conflict, expropriation

---

\*We thank José D. Salas and Alejandro Saenz for superb research assistance. Gallego thanks the CONICYT/Programa de Investigación Asociativa (Project SOC 1102) for financial support. Rubini gratefully acknowledges financial support from Fondecyt grant 11140147. The usual disclaimer applies.

<sup>†</sup>Pontificia Universidad Católica de Chile and EH ClioLab. fgallego@uc.cl

<sup>‡</sup>Pontificia Universidad Católica de Chile and Universidad Carlos III. e-mail: lrubini@uc.cl

<sup>§</sup>Pontificia Universidad Católica de Chile.

# 1 Introduction

A classic question in the development literature is whether aid increases growth. One of the main desired objectives of aid is to take countries out of poverty, and for this to happen aid should increase investment and growth. However, research on the effect on growth remains inconclusive. We argue that one reason for this is that while aid may have positive effects on the rate of growth, it also has effects on other aspects that affect growth, potentially in the opposite direction. In this paper, we focus on one such aspect: social conflict and its interplay with the institutional quality of a specific country.

The strong relationship between aid and conflict has been the focus of a large body of criticism to aid programs. [Anderson \(1999\)](#), [de Waal \(1997\)](#) and [Polman \(2010\)](#) accuse foreign aid programs of promoting conflict. These authors collect a series of anecdotal evidence to show that aid can stir up conflict. More recently, a series of empirical papers that do not rely on anecdotal evidence show that there seems to be a causal positive effect of aid on conflict. These papers include [Nunn and Qian \(2014\)](#), [Crost et al. \(2014\)](#) and [Dube and Naidu \(2010\)](#).

If aid's intended objective is to increase investment (say, by increasing firm value) then growth should increase. But if it has a second, unintended consequence, which is to increase social conflict, then investment could decrease. It is unclear what the ultimate effect of aid on the growth rate is.

Two key questions are: *(i)* when does aid increase social conflict?, and *(ii)* in those events, what is the effect on the growth rate? To guide our research in answering these questions, we build a new model where aid increases the value of firms exogenously. This increases the incentives to invest and subsequently, growth. But it also triggers an endogenous response of social conflict. This response depends on the strength of institutions. Our model predicts that aid increases social conflict only when institutions are weak. Otherwise, aid reduces social conflict. Similarly, when institutions are strong, aid increases the growth rate, and when they are weak, aid may reduce growth.

Our model is very general, and it encompasses a large class of models where there are many firms, free entry, and private agents investing to start new firms. Aid increases the value of firms. We acknowledge that not all aid is destined to increase the value of firms, and a large share is intended to alleviate hunger and disease. However, one can make the argument that healthier workers increase the value of a firm, so our analysis is still valid. In addition, aid destined for clearly different purposes, such as improving road quality, are clear forms of aid increasing the value of a firm.

We do not need to specify the channels through which aid increases firm value, only that it does. The increase in the value of firms, other things being equal, should encourage investment, and subsequently growth. However, other things are not equal. There are households in the economy, that we call "trouble makers", that can engage in conflict to expropriate firms. The increase in the value of firms drives them to increase conflict, deterring private investment and

growth. A key element of the model is that these trouble makers can also choose to start new firms. With limited resources, this implies engaging in less social conflict. So it is not clear that aid increases conflict.

We show that the effect of aid on conflict depends crucially on a parameter closely related with the cost of taking over a firm, which is our measure of institutional quality. More specifically, in our model trouble makers are successful at taking over a firm with an endogenous probability. The key parameter is the elasticity of a successful take over with respect to the resources devoted in the take over activity.

Our main result is that an increase in aid can increase or decrease the growth rate in the recipient country. When institutions are strong, both the increase in the value of firms and the reduction in conflict drive the growth rate up. When institutions are weaker, increases in aid stir up conflict, so the effect on the growth rate is ambiguous. We show that it is possible for growth rates to fall. Moreover, the weaker the institutions, the smaller (less positive or more negative) the effect of aid on growth.

When testing these predictions against the data, our main challenge lies in identifying the causal effect of aid on growth. Running regressions without considering this problem is subject to a series of problems related to omitted variables, measurement error, and reverse causality. For instance, if one considers the reverse causality problems the potential biases can go in both directions. The very fact that a country has a low growth rate may make it eligible for more aid. Similarly, a country that managed to increase its growth rate may receive more aid as a reward.

To work around this issue, we build an instrument for aid motivated by the [Card \(2001\)](#) instruments used in the immigration literature, or the [Bartik \(1991\)](#) instruments in the labor literature. We construct an IV that is the prediction of aid for each country based on total aid flows and the share of total aid that goes to each country on average. This is an innovation in the literature of the effects of aid on growth. In our opinion, previous used in the literature—such as population size, language, and other non-economic variables—are hard to believe to be valid instruments ([Clemens et al., 2012](#)). One exception is the recent paper by [Galiani et al. \(2014\)](#) that exploits a discontinuity in the allocation of aid and, therefore, identifies local effects of aid on growth. We also instrument institutions using potential settler mortality of colonizers from [Acemoglu, Johnson, and Robinson \(2001, 2002, 2005, 2012\)](#).

Our empirical results supports our theoretical predictions. The interaction between institutional quality and aid is statistically significant: in countries with strong institutions, more aid increases growth, but when the institutions are weak, more aid leads to less growth. We find that the threshold level of institutions above which aid produces a positive effect on growth is equivalent to the institutional quality of a country like El Salvador. In terms of economic significance the effects are also substantial: if we just consider African countries included in our sample, an increase of aid equivalent to 1% of GDP would decrease growth by about 2.4% (equivalent to 0.3 standard deviations) on impact in a country with institutional quality equiva-

lent to the Democratic Republic of Congo, the country with the worse institutions in our sample, increase growth by about 1.8% in Kenya (equivalent to 0.22 standard deviations), an African country with institutions around the average of our sample, and increase growth by about 3.3% on impact in Cote d'Ivoire (equivalent to 0.41 standard deviations), one of the African countries with the best institutions in our sample.<sup>1</sup>

We then explore whether the mechanism proposed in our theoretical model is at work. That is, we explore the effect of aid on conflict. Our proxy for conflict is the number of battle deaths in internal conflict over total population from the Peace Research Institute Oslo (PRIO) dataset. Using the same identification strategy, we find that aid reduces conflict under strong institutions, and increases it under weak institutions, thus confirming that the mechanism proposed in our theory is valid. Moreover, we find that the threshold for the quality of institutions that makes the effect of aid switch from increasing to decreasing growth is statistically the same as the threshold for conflict.

Our findings address an existing puzzle in the literature, with very different findings. We conjecture that the problem of identification lies in the fact that aid has different effects on different countries, and this depends on the quality of the institutions. Without controlling for this, robust estimates are very unlikely.

The most salient paper finding a relationship between aid and growth is [Dollar and Burnside \(2000\)](#), which find that aid fosters growth in economies that feature low inflation and are relatively open. The problem is that it is hard to argue that the level of inflation or openness affects how aid impacts growth. Rather, the authors may be partially identifying countries with high risk of conflict in their measures of inflation and openness. In particular, their measure of openness is the measure used in [Sachs and Warner \(1995\)](#), that includes, among other things, whether exporters must first sell to a government, which later exports to the final customer, a clear form of take over. Moreover, [Easterly et al. \(2004\)](#) show that their estimates are not robust to small changes in the periods and countries used in the analysis.

Other papers have also found that the effect of aid depends on variables that are also likely to be correlated with conflict. [Dalgaard et al. \(2004\)](#) find a positive relationship among countries far from the tropics. [Galiani et al. \(2014\)](#) find a local positive effect of aid on growth using a regression discontinuity design for countries located around an income threshold defined by the International Development Association. A third group find no effects of aid on growth. These include [Boone \(1996\)](#), [Easterly \(2003\)](#), [Easterly et al. \(2004\)](#), [Roodman \(2007\)](#), [Rajan and Subramanian \(2008\)](#) and [Werker et al. \(2009\)](#)

Our results are also consistent with papers that claim that aid has a negative impact on growth. These start from [Bauer \(1954\)](#), who focused on Africa, and argued that free money allowed these countries to consume without producing, thus not developing, and building a dependence on richer countries. Along these lines, [Rajan and Subramanian \(2011\)](#) find that

---

<sup>1</sup>It is important to mention that an increase of 1% of GDP is huge relative to the levels of aid we observe.

more aid is associated with lower development of the manufacturing sector. [Soderbom and Teal \(2002\)](#), find that more aid is associated with smaller exporting sectors, thus reducing growth. [Jarotschkin and Kraay \(2013\)](#) explore whether this change happens via an effect on the real exchange rate, but find no evidence of such mechanism.

We contribute to a growing literature that finds causal effects of aid on conflict. [Nunn and Qian \(2014\)](#) show that US food aid programs can cause increases in conflict in recipient countries by exploiting an exogenous source of variability in US food aid timings. Similarly, [Crost et al. \(2014\)](#) study an aid program in the Philippines, in which only municipalities below an arbitrary poverty threshold were eligible. Using a regression discontinuity approach, they find that barely eligible municipalities experienced an increase in conflict relative to barely ineligible municipalities. [Dube and Naidu \(2010\)](#) study the role of military aid in Colombia, to find that increases in military aid increases the number of paramilitary attacks. Our theoretical finding that aid may increase expropriation is consistent with [Ahmed \(2010\)](#), who finds that aid to Muslim countries increases political repression. Relative to these studies, ours is the first to find a non-monotonous relationship between aid and conflict. Our results are consistent with the cited papers as long as these are countries with weak institutions. In other countries, we find, the relationship is the opposite, and aid reduces conflict. Moreover, we also provide a theoretical rationale that can allow to understand why aid may create conflict. In this sense, we are also related to a literature that studies the determinants of conflict. [Blattman and Miguel \(2010\)](#) provide a thorough survey of such research.

This paper is organized as follows. Section 2 describes the uses of aid that motivate our modeling choice. Section 3 proposes a theoretical model to explore the effect of aid on growth in the presence of expropriation and conflict. Section 4 present the econometric framework we use to study the theoretical predictions. Section 5 describes the data we use to test the predictions of the model. Section 6 tests the predictions of the model. Section 7 presents the results of our empirical analyzes on the effects of aid on conflict. Section 8 concludes.

## 2 Uses of Aid

The main point of the model is to understand the potential effects of aid that increases the value of firms. We acknowledge that a large share of aid is not directly focused at increasing firm value, but rather, at improving health and living standards of individuals. However, we argue that this type of aid has in many instances the effect of increasing firm value, since a healthier work force should increase firm value.

Figure 1 shows the distribution of aid by sector. Most aid is concentrated in economic infrastructure (21%), which mostly contains transport related aid (46% of economic infrastructure), such as road building, and energy (34% of economic infrastructure). These are clear items that constitute positive externalities for firms, providing better ways to transport their goods and employees, and better access to electricity. The second largest aid allocation is health (12%,

after adding up the Health and Reproductive Health categories). Healthier individuals make for healthier employees, which are more productive and less absent, also raising firm value (assuming that the additional value is not entirely absorbed by the worker). Other important sectors that are clearly positive externalities to firms are items related to education (7%), and water supply and sanitation (5%). Thus, most aid categories have the effect of raising firm value, justifying our assumption of modeling an increase in aid as an increase in firm value.<sup>2</sup>

A harder question to answer is how effective aid is at accomplishing its goals. The OECD has recently started a series of documents attempting to answer this question, the “Evaluation Insights”. For example, Evaluation Insights Number 6, prepared by the Dutch Ministry of Foreign Affairs (2012), assesses the impact of aid in Rural Water and Sanitation, presently worth almost \$8,000 million. It concludes that there were important improvements in terms of access to drinking water, and moderate health improvements associated with it. The actual investments range from distributing clean containers to store water, installing latrines to end the open defecation areas, to building water processing plants. In Mozambique, for example, installing latrines led 433 villages with around 350,000 people to be declared open defecation free areas. In terms of health benefits, the report shows that the policies in general reduced diarrhoea prevalence, by as much as 26% in Tanzania. The effectiveness of sanitation policies such as installing latrines has other desirable effects, such as increasing education, as [Adukia \(2014\)](#) shows.

Similarly, [Grimm and Paffhausen \(2014\)](#) find that aid destined to improve the business environment, for example, by financing training, had strong effects on increasing the skills of workers (although mild effects on creating employment, which, we argue, is consistent with our theory).

So, how is it that aid might stir conflict? Our mechanism argues that aid creates rents that conflict groups can seize, and the way to seize it is via conflict. An example of such channel is described by [Easterly \(2002\)](#). Between 1978 and 1980, there was a spike in aid in Sri Lanka for a massive irrigation and power project, mostly run by the Sinhalese ethnic group, and the Tamil ethnic group was hardly going to profit from it. This, together with other triggers, escalated into a civil war in 1983 between the Tamil group and the Sinhalese group.

This exemplifies an extreme type of conflict that can be generated by aid that describes our mechanism. We do not need to go to such extremes in the model, but it illustrates how aid can stir up conflict.

---

<sup>2</sup>Alternatively, one could write down a fully specified model for each different type of aid (for instance, an improvement in water supply), and observe the implications for firm value. Each channel should have a quantitatively different effect on firm value. However, since our focus is on the qualitative effects of aid, we take a reduced form approach and assume that aid simply increases firm value.

### 3 Theory

We build on a model with many firms, where investment leads to the creation of new firms, as in [Romer \(1986\)](#). We remain general in terms of the specifics of the model, and merely describe the main features required for illustrating the mechanism at work. The important assumptions are: closed, dynamic economy, many firms in equilibrium, free entry, and the potential for conflict, the latter being the main departure from existing frameworks.

Aid increases firm value. The increase in firm value on the one hand increases the incentives to invest, creating more firms, increasing the growth rate. On the other hand, more valuable firms are more enticing to seize, either by the government or by private parties. Usually, these takeovers are hostile, fostering conflict, with negative impact on the growth rate. Thus, the extent to which an increase in aid increases the growth rate is closely associated with how conflict reacts to the increase of aid, and this depends on the quality of institutions in the recipient country.

For simplicity, there is no capital or any other way to transfer goods between periods. Resources can be transferred though: to consume more in the future, less workers can work in the present and start new firms.

Random draws determine whether a household can expropriate firms, in which case it becomes a hooligan. As an alternative to taking over a firm, hooligans can, as the rest of the households, create new firms. This tradeoff becomes essential: expropriation will increase only when it is “cheap” to do so, otherwise, investment increases, and therefore expropriation decreases.

Finally, markets are complete. This implies that there is a large set of arrow securities that households trade that ensures that consumption in period  $t$  is the same for all of them, regardless of whether they are hooligans or not.

#### 3.1 Model Setting

**Households.** There is a finite and countable number of households. Their within period  $t$  utility function is  $\ln(c_t) - B_t$ , where  $c_t$  is consumption and  $B_t$  is a variable related to being a hooligan, which we describe later. While non-hooligan,  $B_t = 0$ . They discount the future at rate  $\beta \in (0, 1)$ . Their utility function is

$$U = \sum_{t=0}^{\infty} \beta^t [\ln(c_t) - B_t] \quad (3.1)$$

The consumption good  $c_t$  is produced by many firms. It could be the same good, produced by many firms that behave perfectly competitive and have access to a decreasing returns to scale technology as in [Hopenhayn \(1992\)](#), or each firm could produce and sell a differentiated good monopolistically, and  $c_t$  is an aggregate of these goods, as in [Dixit and Stiglitz \(1977\)](#). What is

important is that there is a large pool of potential entrants every period, and must pay an R&D cost of  $\kappa$  units of labor, the numeraire good, to enter.

**Incumbent Firms.** There is a measure  $M_t$  of identical firms in period  $t$ , with firm value  $V_t$ . We assume it is exogenous, but it is trivial to endogenize this as in [Romer \(1986\)](#). Firms are owned by households in equal shares. Any firm can be taken over, under an endogenous probability that we later describe. In that case, the firm changes ownership and belongs to the hooligan. Once the identity of the hooligan changes, their firms are subject to be taken over by the new hooligan. Firms die with an exogenous probability  $\delta \in (0, 1)$ .

**New Firms.** Starting a new firm requires a cost of  $\kappa$  units of labor, the numeraire good. If a potential entrant spends  $\kappa$  units in period  $t$ , it may start producing in period  $t + 1$ . However, the firm may be taken over in period  $t + 1$  or it may die, and never produce.

A key assumption is that there is positive entry every period. This implies that the free entry condition, given an interest rate  $r_t$  and a probability of successful take over  $P_t$ , is

$$\kappa = \frac{1 - \delta}{1 + r_{t+1}}(1 - P_{t+1})V_{t+1}$$

**Conflict.** There are  $M_t$  hooligans in period  $t$ . This number evolves exogenously, so that each hooligan can expropriate at most a measure 1 of firms.<sup>3</sup> No two trouble makers can try to take over the same firm. The probability of a given household of becoming a trouble maker is i.i.d. over time. Also, hooligans are small, in the sense that their actions have no effect on the general equilibrium. This assumption, plus the fact that the probability of becoming a hooligan in any given period is i.i.d., implies that the decisions of hooligans are static.

Hooligans decide the measure of firms  $a \in [0, 1]$  to visit. Once a firm is visited, it is taken over with an endogenous probability  $s \in [0, 1]$ . Hooligans can also create new firms. If they visit  $a$  firms, they create  $(1 - a)$  new firms. They have access to a lower interest rate than ordinary households. Setting this to a constant allows us to obtain closed form solutions, so without loss of generality, we set this equal to zero. Also, a firm started by a hooligan cannot be taken over by another hooligan at birth (although it can be taken over later on).

Conflict has two costs, one associated to an intensive margin, and one to an extensive margin. The cost related to the intensive margin is  $d(s)$ , where  $s \in [0, 1]$  is the probability of the visit being successful and  $d$  represents effort. The cost related to the extensive margin is  $f(a)$ , and it is increasing in  $a$ , the share of firms visited. Given this, we can now define  $B_t = a_t d(s_t) + f(a_t)$ , so the utility function is

$$U = \sum_{t=0}^{\infty} \beta^t [\ln(c_t) - a_t d(s_t) - f(a_t)]$$

---

<sup>3</sup>Notice that this introduces a negative externality to creating a new firm, since expanding the measure of firms also expands the number of hooligans.



Assuming  $f(0) = 0$  implies that  $B_t = 0$  for non hooligans.

The timing of the decisions of a hooligan is as follows:

1. At period  $t$ , a household learns that it has the power to take over firms.
  - Decides the share of firms to visit ( $a_{t+1}$ ) creates  $(1 - a_{t+1})$  new firms
  - Incurs the effort cost  $f(a_{t+1})$ .
  - Pays entry costs in labor units  $(1 - a_{t+1})\kappa$ .
2. In period  $t + 1$ , conflict happens and new firms are born.
  - Hooligans visit firms.
  - They choose the effort to exert to take over firms.
  - The identity of hooligans changes.

To determine their effort, hooligans solve the following problem:

$$\max_{s \in [0,1]} sV - d(s) \tag{3.2}$$

where  $d(s)$  is a cost function with  $d'(s_t) > 0$  and  $d''(s) > 0$ . In particular, assume<sup>4</sup>

$$d(s) = \left[ K - \frac{1}{1 - \frac{1}{\eta}} (1 - s)^{1 - \frac{1}{\eta}} \right]$$

where  $K > 0$  and  $\eta > 0$ . Notice that higher  $K$  increases the cost of exerting effort, and  $\eta$  affects the change in effort given a change in  $V$ : a higher  $\eta$  results in a more responsive  $s$ .<sup>5</sup> Our analysis focuses on this parameter, and a higher value of  $\eta$  represents worse institutions.

Assuming that  $V_t \geq 1$ , the solution to this problem is

$$s_t = 1 - V_t^{-\eta}$$

Notice that  $-\eta$  is the elasticity of the probability of a *failed* take over attempt with respect to the value of the firm. To see this, write the probability of failed take over as

$$1 - s_t = V_t^{-\eta}$$

---

<sup>4</sup>This assumption yields an analytic and tractable probability of expropriation.

<sup>5</sup>The condition that guarantees this is

$$\frac{\partial d'(s)}{\partial \eta} = (1 - s)^{-1/\eta} \ln(1 - s) \eta^{-2} < 0$$

And the elasticity of failed take over with respect to  $V_t$  is

$$\frac{\partial(1-s_t)}{\partial V_t} \frac{V_t}{(1-s_t)} = -\eta$$

For each hooligan, expected profits are:

$$\Pi_{x,t+1} = s_{t+1}V_{t+1} - d(s_{t+1}) = (1 - V_{t+1}^{-\eta})V_{t+1} - \left[ K - \frac{1}{1 - \frac{1}{\eta}} V_{t+1}^{1-\eta} \right] \quad (3.3)$$

Since these households face a zero interest rate, profits from setting up new firms are

$$\Pi_{i,t+1} = -\kappa + (1 - \delta)V_{t+1} \quad (3.4)$$

Let  $f(a)$  be the cost of setting the measure of hooligans to  $a$ , with  $f(a) \geq 0$  for all  $a \in (0, 1)$ ,  $f(0) = 0$ ,  $f'(a) > 0$ ,  $f''(a) > 0$  for all  $a \in [0, 1]$  and  $f'(0) = 0$ ,  $f'(1) = \infty$ .<sup>6</sup> The objective function of the trouble maker is

$$\max_{a \in [0,1]} a\Pi_{x,t+1} + (1-a)\Pi_{i,t+1} - f(a)$$

**The Free Entry Condition.** Ordinary households face a similar problem when setting up new firms, except that they have access to a positive interest rate and face a take over risk. Their problem implies the following free entry condition:

$$\kappa = \frac{1 - \delta}{1 + r_{t+1}} (a_{t+1}V_{t+1}^{-\eta}V_{t+1} + (1 - a_{t+1})V_{t+1})$$

If they get visited, with probability  $a_{t+1}$ , there is a probability  $V_{t+1}^{-\eta}$  of no take over, in which case they keep the firm with value  $V_{t+1}$ . And if they do not get visited, with probability  $1 - a_{t+1}$ , they also keep the firm.

**Aid.** We do not model explicitly a role for aid. Rather, we take a reduced form approach and assume that the effect of aid is to increase the value of firms. More precisely, we assume that an increase in aid in period  $t$  increases the value  $V_{t+1}$ . We remain agnostic about the details to stay as general as possible.

**Complete Markets.** There is a complete set of Arrow securities that households can purchase before they are born. This implies that in equilibrium, hooligans and non hooligans consume the same. Thus, households do not need to incorporate the probability of becoming a hooligan in their intertemporal maximization problem.

---

<sup>6</sup>These conditions guarantee an interior solution for  $a$ . An example is  $f(a) = (1 - a) - \ln(1 - a)$ .

### 3.2 Equilibrium

To compute the equilibrium, we take firm value as given. An increase in aid increases the value of firms, so our set up works in a large class of models, provided that an increase in aid increases the value of a firm. In particular, we assume that an increase in aid in period  $t$  increases  $V_{t+1}$ .

The solution to the consumer problem delivers the Euler equation:

$$\frac{C_{t+1}}{C_t} = \beta(1 + r_{t+1})$$

Since this is a closed economy with no capital (and no storage),  $Y_t = C_t$ , so that the Euler equation becomes

$$g_t = \beta(1 + r_{t+1})$$

where  $g_t = \frac{Y_{t+1}}{Y_t}$  is the rate of growth of the economy in period  $t$ . Combining the Euler equation with the free entry condition,

$$g_t = \beta \frac{(1 - \delta)}{\kappa} (a_{t+1} V_{t+1}^{1-\eta} + (1 - a_{t+1}) V_{t+1}) \quad (3.5)$$

Equation (3.5) is central for our analysis. It relates a change in the value of a firm with the aggregate growth rate. To see the intuition, suppose  $a_{t+1} = 1$ . Recall that an increase in aid increases the value function. Whether this increases the growth rate depends on  $\eta$ . If  $\eta < 1$ , so that the institutional quality is high, an increase in aid increases the growth rate. But if  $\eta > 1$ , an increase in aid reduces the growth rate. In the next section we show that this intuition carries through to the case where  $a_{t+1} < 1$ .

The first order condition of a hooligan is<sup>7</sup>

$$\Pi_{x,t+1} - \Pi_{i,t+1} - f'(a_{t+1}) = 0 \quad (3.6)$$

The next section explores the effects of an increase in aid on the measure of hooligans and on the aggregate growth rate, paying special attention to how these effects change with the quality of institutions parameter  $\eta$ .

### 3.3 The Effect of an Increase in Aid

We model an increase in aid in period  $t$  as an increase in  $V_{t+1}$ , the value of the firm in period  $t+1$ . We are interested in determining how it affects the aggregate growth rate, and the resources devoted to conflict  $a_{t+1}$ . In section 6 we test whether our predictions hold in the data, and map  $a_t$  to conflict.

We start by showing how aid affects  $a_{t+1}$ , and the role of institutions. In particular, a low value of  $\eta$  represents strong institutions, and a large value of  $\eta$  weak institutions.

<sup>7</sup>We set  $\kappa$  and  $K$  so that  $\Pi_{x,t+1} > \Pi_{i,t+1}$ , keeping in mind that  $K$  must also satisfy  $d(s) > 0$ .

Proposition 1 shows that, when institutions are strong, an increase in aid reduces conflict, and when institutions are weak, conflict increases. Proposition 2 shows that conflict is higher when institutions are weak. Proposition 3 shows that an increase in aid increases the growth rate when institutions are strong, and it may reduce it when institutions are weak. Proposition 4 shows that the increase in growth rate associated with an increase in aid is higher when institutions are strong.

**Proposition 1** *When  $\eta$  is small, an increase in aid reduces conflict. When  $\eta$  is large, an increase in aid increases conflict. That is, there exist numbers  $\eta_1 > 0$  and  $\eta_2 > 0$ , with  $\eta_1 < \eta_2$ , such that*

$$\frac{\partial a_{t+1}}{\partial V_{t+1}} < 0 \quad \text{when } \eta < \eta_1 \quad \text{and} \quad \frac{\partial a_{t+1}}{\partial V_{t+1}} > 0 \quad \text{when } \eta > \eta_2$$

**Proof:** Differentiate equation (3.6) with respect to  $V$  and use equation (3.4) to get:

$$\frac{\partial \Pi_{x,t+1}}{\partial V_{t+1}} - (1 - \delta) - f''(a_{t+1}) \frac{\partial a_{t+1}}{\partial V_{t+1}} = 0$$

By applying the envelope theorem to problem (3.2) and using equation (3.3), we know

$$\frac{\partial \Pi_{x,t+1}}{\partial V_{t+1}} = s_{t+1} = 1 - V_{t+1}^{-\eta}$$

Thus

$$\frac{\partial a_{t+1}}{\partial V_{t+1}} = \frac{1 - V_{t+1}^{-\eta} - (1 - \delta)}{f''(a_{t+1})} \tag{3.7}$$

The denominator is positive by assumption. So the sign of  $\frac{\partial a_{t+1}}{\partial V_{t+1}}$  is equal to the sign of the numerator. Taking limits in  $\eta$  to the numerator:

$$\begin{aligned} \lim_{\eta \rightarrow 0} 1 - V_{t+1}^{-\eta} - (1 - \delta) &= -(1 - \delta) < 0 \\ \lim_{\eta \rightarrow \infty} 1 - V_{t+1}^{-\eta} - (1 - \delta) &= \delta > 0 \end{aligned}$$

By continuity, there exist two numbers  $\eta_1 > 0$  and  $\eta_2 > 0$ , with  $\eta_1 \leq \eta_2$  such that

$$\begin{aligned} \frac{\partial a(\eta)}{\partial V_{t+1}} &< 0 \quad \forall \eta < \eta_1 \\ \frac{\partial a(\eta)}{\partial V_{t+1}} &> 0 \quad \forall \eta > \eta_2 \end{aligned}$$

□

**Proposition 2**  $a$  is larger when  $\eta > 1$  than when  $\eta < 1$ .

**Proof:** Equation (3.6) determines  $a$ , and notice that only  $\Pi_x$  in the equation is affected by  $\eta$ . In particular, since  $f''(a) > 0$ ,  $a$  increases only if  $\Pi_x$  increases. Let  $\eta_l < 1 < \eta_h$ . Then

$$\begin{aligned}\Pi_x(\eta_l) &= V - V^{1-\eta_l} - K + \frac{1}{1 - \frac{1}{\eta_l}} V^{1-\eta_l} < \\ &V - V^{1-\eta_h} - K + \frac{1}{1 - \frac{1}{\eta_h}} V^{1-\eta_l} < \\ &V - V^{1-\eta_h} - K + \frac{1}{1 - \frac{1}{\eta_h}} V^{1-\eta_h} = \Pi_x(\eta_h)\end{aligned}$$

The first inequality is because  $V^{1-\eta_l} > 1 > V^{1-\eta_h}$ . The second because  $\frac{1}{1 - \frac{1}{\eta_l}} < 0 < \frac{1}{1 - \frac{1}{\eta_h}}$ . Thus,

$$f'(a(\eta_1)) < f'(a(\eta_2)) \iff a(\eta_1) < a(\eta_2)$$

□

**Proposition 3** An increase in aid increases the growth rate when  $\eta$  is small, and it may reduce it when  $\eta$  is large.

**Proof:** From equation (3.5)

$$g_t = \frac{\beta}{\kappa} (1 - \delta) (a_{t+1} V_{t+1}^{1-\eta} + (1 - a_{t+1}) V_{t+1})$$

First we show that, if  $\eta$  is small, an increase in aid increases the growth rate. From Proposition 1, for all  $\eta < \min\{\eta_1, 1\}$ , where  $\eta_1$  is defined as Proposition 1,  $\frac{\partial a}{\partial V} < 0$ . Since  $\eta < 1$ , an increase in aid increases both  $V$  and  $V^{1-\eta}$ , and reduces  $a$ . All three of these changes lead to an increase in  $g$ , since  $V > 1$  implies  $V > V^{1-\eta}$ .

To show that  $g$  may decrease with aid, first take derivatives of equation (3.5) with respect to  $V$ .

$$\frac{\partial g_t}{\partial V_{t+1}} = \frac{\beta}{\kappa} (1 - \delta) \left( \frac{\partial a_{t+1}}{\partial V_{t+1}} V_{t+1}^{1-\eta} + a_{t+1} (1 - \eta) V_{t+1}^{-\eta} - \frac{\partial a_{t+1}}{\partial V_{t+1}} V_{t+1} + (1 - a_{t+1}) \right)$$

Consider an equilibrium where  $a_{t+1} = 1 - \varepsilon$ , for some  $\varepsilon \in (0, 1)$ .<sup>8</sup> The expression above becomes

$$\frac{\partial g_t}{\partial V_{t+1}} = \frac{\beta}{\kappa} (1 - \delta) \left( \frac{\partial a_{t+1}}{\partial V_{t+1}} (V_{t+1}^{1-\eta} - V_{t+1}) + (1 - \varepsilon) (1 - \eta) V_{t+1}^{-\eta} + \varepsilon \right)$$

<sup>8</sup>We can arbitrarily design  $f(a)$  to deliver any value of  $a \in [0, 1]$ .

Consider a large  $\eta$ , such that  $\eta > \max\{\eta_2, 1\}$ , where  $\eta_2$  is defined as in Proposition 1. Taking limits as  $\varepsilon \rightarrow 0$ ,

$$\lim_{\varepsilon \rightarrow 0} \frac{\partial g_t}{\partial V_{t+1}} = \frac{\beta}{\kappa} (1 - \delta) \left( \frac{\partial a_{t+1}}{\partial V_{t+1}} (V_{t+1}^{1-\eta} - V_{t+1}) + (1 - \eta) V_{t+1}^{-\eta} \right) < 0$$

since  $\frac{\partial a_{t+1}}{\partial V_{t+1}} > 0$  by Proposition 1,  $V_{t+1} > 1$  implies  $(V_{t+1}^{1-\eta} - V_{t+1}) < 0$  and  $\eta > 1$ . By continuity, there exists some  $\varepsilon > 0$  such that  $\frac{\partial g_t}{\partial V_{t+1}} < 0$  for some  $\eta > 1$ . □

Proposition 3 shows that when the quality of institutions is high, an increase in aid will increase the growth rate. But if the quality of institutions is low, an increase in aid may reduce it. The intuition for this is as follows. First consider the effects of aid under high quality institutions. An increase in aid increases  $V$  and  $V^{1-\eta}$  when  $\eta < 1$ . So the only reason why the growth rate would not increase would be if  $a$  dropped. But Proposition 1 shows that, at least for some range of  $\eta$ , the opposite is true, so that the growth rate increases.

On the other hand, when  $\eta$  is large, (in particular, larger than 1), an increase in  $V$  reduces  $V^{1-\eta}$  and increases  $V$ . In addition, Proposition 1 shows that, if  $\eta$  is large enough,  $a$  increases, thus putting more weight on  $V^{1-\eta}$ , which drops. However, it is not necessarily true that  $g$  decreases when aid increases and  $\eta$  is large. In particular, if  $a$  is close to zero, and changes little with aid, the increase in  $V$  may more than compensate for the reduction in  $V^{1-\eta}$ , so that  $g$  increases.

**Proposition 4** *The increase in the growth rate given an increase in aid is larger when  $\eta$  is small than when  $\eta$  is large.*

**Proof:** Let  $\eta_l < \min\{1, \eta_1\}$  and  $\eta_h > \max\{1, \eta_2\}$ , where  $\eta_1$  and  $\eta_2$  are defined as in Proposition 1. □

$$\begin{aligned} \frac{\partial g(\eta_l)}{\partial V} &= \frac{\beta(1-\delta)}{\kappa} \left[ -\frac{\partial a(\eta_l)}{\partial V} (V - V^{1-\eta_l}) + a(\eta_l)(1 - \eta_l)V^{-\eta_l} + 1 - a(\eta_l) \right] > \\ &\frac{\beta(1-\delta)}{\kappa} \left[ -\frac{\partial a(\eta_h)}{\partial V} (V - V^{1-\eta_h}) + a(\eta_h)(1 - \eta_h)V^{-\eta_h} + 1 - a(\eta_h) \right] > \\ &\frac{\beta(1-\delta)}{\kappa} \left[ -\frac{\partial a(\eta_h)}{\partial V} (V - V^{1-\eta_h}) + a(\eta_h)(1 - \eta_h)V^{-\eta_h} + 1 - a(\eta_l) \right] > \\ &\frac{\beta(1-\delta)}{\kappa} \left[ -\frac{\partial a(\eta_h)}{\partial V} (V - V^{1-\eta_h}) + a(\eta_h)(1 - \eta_h)V^{-\eta_h} + 1 - a(\eta_h) \right] = \frac{\partial g(\eta_h)}{\partial V} \end{aligned}$$

The first inequality is because  $-\frac{\partial a(\eta_l)}{\partial V} > 0 > -\frac{\partial a(\eta_h)}{\partial V}$  from Proposition 1. The second because  $1 - \eta_l > 0 > 1 - \eta_h$ . The third because  $a(\eta_l) < a(\eta_h)$  from Proposition 2. □

In the next section we test whether our propositions hold in the data. In particular, we test whether better institutions imply that an increase in aid increases the growth rate and reduces conflict (our proxy for  $a$ ). We test whether in countries with really poor institutions, an increase in aid can actually reduce the growth rate and increase conflict.

## 4 Empirical Framework

Using the theoretical background described above, we develop in this section an empirical investigation of the effects of aid on growth and proxies of social conflict at the country level. Our main hypotheses are the following:

- First, the effect of aid on growth depends on the strength of institutions. The stronger the institutions, the larger the increase in growth from an increase in aid. In particular, when institutions are very weak, an increase in aid can reduce growth.
- Second, one particularly important mechanism that explains the previous result is the existence of social conflict. Analogous to the case of the effect of aid on growth, the effect of aid on conflict depends on the existence of strong institutions: where institutions are better, an increase in aid reduces conflict, and where institutions are worse, an increase in aid can increase conflict.

Next we describe the empirical methodology we use to study these hypotheses. Our basic approach uses panel data models to analyze the effects of aid on growth and conflict. First, we study the impact of aid on growth using the following estimating equation:

$$g_{i,t} \equiv \ln y_{i,t} - \ln y_{i,t-1} = \rho \ln y_{i,t-1} + A_{it}\beta + A_{it} \cdot I_i\gamma + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (4.1)$$

where  $i$  represents country and  $t$  represents period.  $g_{i,t}$  is growth rate of GDP per capita,  $y_{it}$  is GDP per capita,  $A_{it}$  is the ratio of aid to GDP,  $I_i$  is a time-invariant measure of institutions,  $\alpha$  denotes country fixed-effects,  $\eta$  time fixed-effects, and  $\varepsilon$  is an idiosyncratic shock.  $\rho$  captures the potential existence of conditional convergence and any other phenomenon that produces inertia in  $y$ . In turn,  $\gamma$  is the main coefficient of interest, which represents the interaction between aid and institutions. If our first hypothesis is correct  $\gamma$  should be positive and statistically and economically relevant, since an increase in  $I$  in our data represents better institutions.

The estimation of equation (4.1) faces several challenges. The most obvious is that  $A_{it}$  may be endogenous due to reverse causality<sup>9</sup>, omitted variables, and measurement error, among other problems. The inclusion of country and time fixed-effects may help us to solve partially these problems. However, there may still be country-specific time-varying factors that bias the

---

<sup>9</sup>For example, [Easterly \(2002\)](#) argues that the World Bank gives more aid to good policy countries, but the reward for good policies is small.

estimates of  $\gamma$ . We follow several papers in the literature by using instrumental variables to deal with this problem. However, we depart from the previous papers by using a new IV because we think it is hard to believe that the IVs used in other papers meet the exclusion restrictions. Clemens et al. (2012) and Galiani et al. (2014) discuss in detail these problems. Several of the IVs used in these studies (such as population size, economic policies and donor-recipient political connection) probably violate the exclusion restrictions, as they may have direct effects on growth above the impacts through aid. Other papers exploit the dynamic structure of the data to construct “internal” IVs (i.e., lagged realizations). Clemens et al. (2012) and Galiani et al. (2014) also discuss how this strategy may also suffer from the problem of a potential violation of the exclusion restrictions but these variables can also have a weak instrument problem that can compromise the validity of the IV results.

We also exploit the panel structure of the data but using a different source of variation. Our IV follows the motivation of Card (2001) for the effect of immigration shocks to local markets in the US. The idea is to exploit movements in aggregate levels of aid flows and time-invariant characteristics to allocate aid flows to particular countries. Our IV has the following form:

$$\hat{A}_{it} \equiv \frac{A_t^* \cdot \lambda_i}{GDP_{it}}$$

where

$$\lambda_i \equiv \frac{\sum_t A_{it}}{\sum_i \sum_t A_{it}} \text{ and } A_t^* = \sum_i A_{it} \quad (4.2)$$

Thus,  $\lambda_i$  represents the average share of aid going to a country in the complete sample (i.e., using data from 1960 to 2011). Thus, the country-time variation of  $\hat{A}_{it}$  comes from the product of a variable that varies at the time level (aggregate aid flows,  $A_t^*$ ) and a variable that moves at the country level (the average share of aid going to a particular country,  $\lambda_i$ ). Notice that we already include time and country fixed-effects in our regressions and, therefore, we are taking care of any omitted variable that varies at the country or time levels.

A second relevant endogeneity problem is related to institutions ( $I_i$ ). We deal with this problem in several ways. First, notice that we use average institutions so we do not face the problem that any time variation in institutions may be endogenous. Actually, we do not include the direct effect of average institutions on growth as we already include country fixed-effects that capture the effects of any constant country-level variable on growth. Second, we take advantage of the literature on causal effects of institutions (Acemoglu et al., 2001, 2002, 2006) and use potential settler mortality faced by the colonizers ( $Z_i$ ) as an IV for  $I_i$ . Thus, we restrict the sample in which we estimate to the sample of former colonies for which this identification strategy works.

Thus, we have two endogenous variables ( $A_{it}$  and  $A_{it} \cdot I_i$ ) in equation (4.1) and use two IVs for these variables ( $\hat{A}_{it}$  and  $\hat{A}_{it} \cdot Z_i$ ).



Finally, we also face the problem that we include  $\ln y_{t-1}$  and  $\alpha_i$  as regressors in (4.1) and we have to address the potential biases that can arise when estimating a quasi-dynamic panel with country fixed effects (Nickell 1981, Alvarez and Arellano 2003). However, it is worth noting that the potential problems that arise due to this fact mainly affect the coefficient on lag per-capita income and, through that, to the other variables. In order to deal with this problem, we considered using estimators that exploit the dynamic nature of the data, such as the Anderson and Hsiao method in first differences and the several GMM procedures used in the literature. However, these methods suffer from serious under-identification problems, in particular in our sample. For instance, using the Anderson and Hsiao method, we got models with Cragg-Donald statistics as low as 2 or 1. Thus, we do not report the estimates of this under-identified models. As the specific value of the parameter on  $\ln y_{t-1}$  ( $\rho$ ) is not of particular interest to our theory, we follow Acemoglu et al. (2014b), and transform the model and impose values for  $\rho$ .

Next, we estimate the impact of aid on conflict using a similar approach. Our main estimation equation is:

$$c_{i,t} = \pi c_{i,t-1} + A_{it}\tau + A_{it} \cdot I_i\phi + \varpi \ln y_{i,t-1} + \alpha_i + \eta_t + \varepsilon_{i,t}. \quad (4.3)$$

We face similar challenges than in the case of the effect of aid on growth and we use similar econometric tools. Our theory implies that  $\tau > 0$  and  $\phi < 0$ .

## 5 Data

We constructed a data set that covers 62 countries for the 1960-2011 period. This section discusses general features of the data and data sources. Summary statistics for all variables are in Table 1.

The main variable of interest in our analysis is the level of aid that receives each country in each period. This is defined as the ratio between external aid received in period  $t$  and GDP in the same period  $t$ . Our measure for aid comes from the OECD Development Assistance Committee (OECD-DAC) database. We use data in the category ‘‘Official Development Assistance (ODA)’’ in current dollars, following Rajan and Subramanian (2008). ODA is defined as ‘‘the flows to countries and territories on the Development Assistance Committee (DAC) list of recipients and to multilateral institutions which are: (i) provided by official agencies, including state and local governments, or by their executive agencies; and (ii) each transaction of which is administered with the promotion of the economic development and welfare of developing countries as its main objective; and is concessional in character and conveys a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent).’’<sup>10</sup>

Another important variable of interest for our theory is a measure of institutions. The institutional data comes from the Political Risk Service database, and we focus on the variables

<sup>10</sup>Definition from <http://www.oecd.org/dac/stats/officialdevelopmentassistancedefinitionandcoverage.htm>

measuring the Risk of Expropriation, as [Acemoglu et al. \(2001\)](#) and (2002). This variable ranges from 0 to 10, where 10 means no risk and 0 is the maximum risk. We use the average between 1985 and 1995. This is the reason for which we limit our sample to the countries that include the death rate of colonizers, which we use to build our instrument for institutional quality as in [Acemoglu et al. \(2012\)](#).

In terms of dependent variables, GDP and population data comes from the World Development Indicators. As a measure of conflict, we use number of battle deaths in internal conflict over total population. Data on deaths come from the Peace Research Institute Oslo (PRIO) data set in [Gleditsch et al. \(2002\)](#). We consider internal conflict defined as: (i) armed conflict between the government of a state and one or more internal opposition group(s) without intervention from other states, and (ii) internationalized internal armed conflict between the government of a state and one or more internal opposition group(s) with intervention from other states (secondary parties) on one or both sides. We scale the number of deaths by the total population in each year.

In robustness exercises we also use information on human capital from [Acemoglu et al. \(2014a\)](#)—who construct the data using information from [Barro and Lee \(2013\)](#) and [Cohen and Soto \(2007\)](#)—and on distance to the Equator from [Dalgaard et al. \(2004\)](#).

Figure 2 presents  $A_t^*$  from 1960 to 2011 and Table 2 presents information for  $\lambda_i$ . A potential concern with our instrument is that, if there is a country that receives a very large share of aid, so that it can considerably affect total aid  $A_t^*$ , then we would still be subject to endogeneity concerns. This does not seem to be a problem, since for around 80% of the sample  $\lambda_i$  is less than 2%. Figure 3 shows the distribution of the ratio of aid to GDP across countries. Also, the country with the highest level of  $\lambda_i$  is Egypt with a value of 5.18%. Still, we estimate equation (4.1) excluding the countries with the highest values of  $\lambda_i$  in one robustness exercise. Also, as a falsification test, we show that the current level of  $\hat{A}_{it}$  is not correlated with past realizations of  $g_{it}$ .

## 6 Main Results: Aid and Growth

We start by showing the correlation between our instrument for aid  $\hat{A}_{it}$  and the ratio of aid to GDP in each country. Figure 4 presents visually the “first stage”: a regression of  $A_{it}$  on  $\hat{A}_{it}$  after controlling for country and time fixed effects (i.e., the coefficient captures the within country variation of  $A_{it}$ ). The coefficient on  $\hat{A}_{it}$  is equal to 0.79 and suggests that our IV is correlated to aid but that also that there is a lot of variation in aid that cannot be explained by our instrumental variable.

Table 3 presents the main results of the estimates in our paper. We present estimates for panel data considering a data set with four-year periods.<sup>11</sup> Panel A presents the estimates for

<sup>11</sup>We also estimate the model using six-year periods and find very similar results.

the second stage. Panel B presents estimates for the first-stages for the two endogenous variables for our main specification (column 3).

In addition to the IV method described in section 4, we produce OLS estimates of estimates of equation (4.1) for comparison. Column (1) in table 3 presents these OLS estimates. They imply a positive correlation of aid and growth, which is higher for countries with weak institutions (as the coefficient on the term  $A_{it} \cdot I_i$  is negative). These results are not causal estimates and they probably capture reverse causality and the fact that aid is more correlated with growth in countries with weak institutions. In particular, it may be illustrating the problem of endogeneity, the very reason for which we develop our IV estimates. Picture a country that is developing, and therefore growing. The very fact that it is growing may imply that it starts receiving less aid, which generates the observed signed of the OLS coefficient.

Next, column (2) presents IV estimates of the effect of aid on growth without allowing for an interaction effect with institutions (ie., assuming that  $\gamma = 0$  in equation (4.1)). The results imply a negative but statistically insignificant effect of aid on growth. This result is consistent with previous papers, such as Rajan and Subramanian (2008) and Roodman (2007), that find a zero impact on average of aid on growth. It is worth emphasizing that our estimates use a new instrumental variable that in our opinion is much more valid than the ones used in the previous literature, as we discussed above. It is worth noting that the Cragg-Donald statistic suggest that we have a powerful first stage.

Next in column (3) we move to the central results of our paper. We estimate a complete version of equation (4.1). Results are consistent with the arguments from Section 3 and the empirical estimates imply that  $\beta < 0$  and  $\gamma > 0$ . Thus, the effect of aid on growth depends on the type of institutions. The estimates imply that a shock of aid for countries with expropriation risk of about five (equivalent to the institutions of countries like El Salvador and Niger) have a zero impact on growth levels. Figure 5 presents the marginal effects of aid on growth obtained from the estimates.

In terms the first stages, the Cragg-Donald statistic suggests that we have a powerful first stage. Results in Panel B also confirm the fact that we have relevant first stages. In terms of the estimates for the effect of conditional convergence, we find a value of about  $-0.07$  which is consistent with results in Barro and Sala-i-Martin (2004) and others.

As we discussed before, our results may be biased given that we have a quasi-dynamic panel data set with country fixed effects. Then, as an alternative procedure to estimate the robustness of our results to the fact that we have a quasi-dynamic panel, we follow Acemoglu et al. (2014a) in which we imposed several values for the conditional convergence coefficient. In particular, we re-define the LHS variable in equation (4.1) as:

$$g_{i,t} - \rho \ln y_{i,t-1} = A_{it}\beta + A_{it} \cdot I_i\gamma + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (6.1)$$

using the following values for  $\rho = \{-0.02, -0.04, -0.06, -0.08, -0.10, -0.12\}$ . In this way we

avoid the problem of losing efficiency in our estimates and somehow avoid the problem of having a quasi-dynamic panel. We present the results in the last six columns. Interestingly, we find that in all the specifications our estimates for  $\beta$  and  $\gamma$  are consistent with our previous estimates and always statistically significant. It is also interesting that the institutional level for which aid has a zero impact on growth is remarkably consistent across specifications, as presented at the bottom of Table 3.

The results confirm the intuition of our theoretical model: the effects of aid on growth depend upon the institutional levels of different countries. Our results are also interesting because they provide an alternative interpretation for the previous results in the literature: the non-existent average effect of aid on growth found in several previous papers masks significant heterogeneity in which for some countries aid has actually negative impact on growth, while for other countries the impact of aid on growth is positive.

The estimates in column (4) imply that an increase of aid of 1% of GDP causes a decrease on impact of 2.4 percentage points (0.30 standard deviations) of per-capita growth in the case of the Democratic Republic of Congo, an increase of growth of 1.2 percentage points (0.15 standard deviations) in the case of Peru, 2.5 percentage points (0.31 standard deviations) in the case of Ecuador, and 4.6 percentage points (0.57 standard deviations) for Chile. However, these figures are not informative, since an increase of 1% might be an outrageous amount for some countries, but not so much for others. For example, it implies increasing by about 50% the aid in Congo, but increasing aid received in Chile 12.5 times!

To grasp the economic significance of the estimates, we report elasticities. In particular, we compute the elasticity of the growth rate with respect to aid as follows:

$$Elasticity = \frac{\partial g}{\partial A} \frac{A}{g} = (\beta + I_i \gamma) \frac{\sum_t A_{it}/T}{\sum_t g_{it}/T}$$

where  $\beta$  and  $\gamma$  are the estimates in equation (6.1), reported in column 3 in Table 3, and  $T$  is the total number of periods in the sample.

Take two African countries, one with strong institutions such as Egypt and one with weak institutions such as Congo. Increasing the ratio of aid to GDP by 1% would increase the growth rate in Egypt by 0.18%, and reduce the growth rate in Congo by 0.11%. In Chile, growth would increase by 0.04%. Figure 6 plots the elasticity of the growth rate to the ratio aid to GDP for all the countries in the sample, and figure 7 does the same excluding countries with elasticities above 0.5 and below -0.5. The relationship between the elasticity and the risk of expropriation is somewhat positive. More importantly, when institutions are above 4.98, all the elasticities are positive, and below it, they are negative.

Table 4 describes a number of robustness exercises. Column (1) presents results of placebo test in which we run the current realization of our instruments on past values of growth (and we also lag initial GDP per capita one period). Results imply that none of the two IVs are statistically significant. This is reassuring, as it implies that our IVs are not correlated with

future realizations of growth. Next, in column (2) we exclude some countries that in average receive high levels of aid. As we discuss in section 5 and as presented in Figure 2, for about 80% of the countries, the ratio of aid to GDP has a value below 1%. We exclude eight countries with high levels of  $\lambda$ .<sup>12</sup> Results are for the most part very similar to the results in Table 3. In addition, as noticeable at the bottom of the Table, the Cragg-Donald statistic suggests that we still have a powerful first stage even when we excluded the main receptors of aid included in our sample.

In columns (3) and (4), we explore whether alternative explanations in which either education levels or geographic factors explain the interaction effects we reported before. If we find similar values  $\gamma$  when using these alternative variables, it may be possible that these two variables or even other variables –which may be correlated with institutions– could explain our results. Results in these two columns are reassuring, as we do not find the coefficient on the interaction of aid and each variable to be significant. In fact, if anything the point estimate of years of schooling is negative (in contrast with our theory and our previous results).

Overall, the evidence in this section supports the theoretical argument that aid has heterogeneous effects of growth depending upon institutions. Moreover, robustness exercises suggest the results are not driven by alternative explanations –such as a role for human capital or geographical explanations– and estimation problems related to outliers.

## 7 Mechanisms: Aid, Institutions, and Conflict

Our argument postulates that the impact of aid on growth operates through a mechanism fundamentally related to the fact that aid may create incentives to increase firm take overs and conflict in societies in which institutions are not strong. If this is the case, we should estimate a positive interaction between aid and institutions in equation (4.3).

Our proxy for social conflict is the number of battle deaths in internal conflict over total population from the PRIO data set. We do this because this variable allows us to have a panel data with a similar coverage than our regressions for the effect of aid on growth and also because a recent literature has presented interesting evidence on the causal impacts of aid on conflict in countries receiving external funds, including Nunn and Qian (2014), Crost et al. (2014) and Dube and Naidu (2010). Our theoretical model suggests that there are good conceptual reasons to expect that the type of interaction effects among institutions and aid that we find for growth should also be present for conflict. Thus, we follow a very similar approach to what we did for growth and estimate equation (4.3) using the same econometric approach than we use for growth in equation (4.1). Thus, we estimate the effect of aid, and the interaction of aid and institutions on conflict levels using a panel data framework in which we include country and time fixed effects and also lagged GDP per capita as a control.

---

<sup>12</sup>These countries are Egypt, China, Indonesia, India, Pakistan, Thailand, Bangladesh, and Nigeria.

Table 5 presents the results. As before, column (1) present OLS estimates of equation (4.1). The estimates for the effects of  $A_{it}$  and  $A_{it} \cdot I_i$  are not statistically significant but point out to a positive effect of  $A_{it}$  on conflict and negative interaction effect of  $A_{it} \cdot I_i$ , which is consistent with the theoretical predictions of our model. Initial income presents a negative impact –as expected–but the effect is not statistically different from 0. The same is true regarding the lagged realization of conflict that presents an effect which is close to 0. Next in column (2) we move to IV estimates of  $A_{it}$  on conflict, assuming there are no heterogeneous effects depending on  $I_{it}$ . Results imply a zero effect of aid on conflict, using our identification strategy that depends on predicted aid. This is also consistent with our growth results in which we also found a zero impact of aid on growth in our specification without allowing for heterogeneous effects.

Column (3) presents the results of estimating the complete version of equation (4.3). Results imply a positive impact of  $A_{it}$  on growth and a negative interaction of  $A_{it} \cdot I_i$ . This is exactly consistent with our theoretical framework. Moreover, reassuringly, the threshold level of institutions for which the effect of aid on conflict is zero is 4.7, which is consistent with the results that we get from estimating equation (4.1) in Table 3. This is important as an indirect test for our theoretical argument that conflict is relevant to to explain our growth results.

Finally, in columns (4) to (9), we study the robustness to our results when allowing for the presence of serial-correlation in the dependent variable. Reassuringly, while the point estimates change a bit across specifications, the signs of the variables of interest and the threshold level of institutions for which the impact of aid on conflict is zero is robust across specifications.

In terms of the economic significance of the effects, the estimates in column (3) imply that an increase of aid of 1% of GDP causes an increase on impact of one death per 1,000 people (0.65 standard deviations) due to internal conflict in the case of the Democratic Republic of Congo, a decrease of about 1.3 deaths per 1,000 people (0.85 standard deviations) in the case of Peru, 1.4 deaths per 1,000 people (0.91 standard deviations) in the case of Ecuador, and 1.5 deaths per 1,000 people (0.98 standard deviations) for Chile.

As in the case of growth, these numbers do not mean much, given that the average aid received in each country varies greatly. For that reason, figure 8 shows the elasticity of conflict to aid, while figure 9 excludes countries with elasticities larger than 5 or smaller than -5. In Congo, increasing the ratio of aid to GDP by 1% increases conflict by 0.22%. In Peru, this elasticity is -0.13%, and in Chile, -0.6%.

## 8 Conclusion

Foreign aid can be a relevant policy tool for providing stimulus for countries to increase growth and development. However, the empirical evidence has not been decisive on this issue, with studies concluding results in several directions. Some estimates suffer from identification problems, other suffer from conceptual shortcoming that make difficult to interpret the evidence. Our paper tries to offer both a theoretical rationale and new causal evidence that constitute an

alternative explanation: that the effect of aid on growth depends on the elasticity of conflict to aid.

Our theoretical model rationalizes the potential effect of aid on growth and conflict. Aid increases the value of firms, which increases the incentives to invest and subsequently, growth. But it also triggers an endogenous response of social conflict. This response depends on the strength of institutions. Our model predicts that aid increases social conflict only when institutions are weak. Otherwise, aid reduces social conflict. Similarly, when institutions are strong, aid increases the growth rate, and when they are weak, aid may reduce growth. Our model can be generalized to incorporate that not all aid is destined to increase the value of firms, and a large share is intended to alleviate humanitarian goals such as decreasing hunger and disease. This is because one can make the argument that healthier workers increase the value of a firm.

Empirically, we confirm our theoretical predictions with regards to the effect of aid on growth. To reach this conclusion, we rely on a novel instrument that addresses a well known endogeneity problem when dealing with aid. Moreover, we show that the mechanism that we propose in our theoretical model is strong in the data: when aid leads to lower growth, it also leads to increased conflict, and viceversa.

The effects we find are relevant for optimal policy design: we find a threshold equivalent to the institutional quality of a country like El Salvador, above which an increase in aid causes a significant increase in growth and significant decreases in conflict and below which more aid seems to create adverse effects. If donors want to have the desired effects of aid in countries with low institutional quality, they need additional instruments. One possibility is that aid donor countries can condition aid on a commitment to increase institutional quality. Another possibility is that aid can be distributed jointly with other policies aimed at decreasing conflict. Going back to [Easterly \(2002\)](#)'s example that we cited before, aid can be restricted in cases where only a few of the existing ethnic groups benefit, and try to be more inclusive of different ethnicities. This is important, as our theoretical and empirical results, suggest that aid does not necessarily increase social conflict but that the effect depends on the incentives provided for the institutional framework.

## References

- Acemoglu, Daron, Francisco Gallego, and James A. Robinson**, “Institutions, Human Capital and Development,” NBER Working Papers 19933, National Bureau of Economic Research, Inc February 2014.
- , **Simon Johnson, and James A. Robinson**, “The Colonial Origins of Comparative Development: An Empirical Investigation,” *American Economic Review*, December 2001, *91* (5), 1369–1401.
- , – , and – , “Reversal Of Fortune: Geography And Institutions In The Making Of The Modern World Income Distribution,” *The Quarterly Journal of Economics*, November 2002, *117* (4), 1231–1294.
- , – , and – , “Institutions as a Fundamental Cause of Long-Run Growth,” in Philippe Aghion and Steven Durlauf, eds., *Handbook of Economic Growth*, Vol. 1 of *Handbook of Economic Growth*, Elsevier, 2005, chapter 6, pp. 385–472.
- , – , and – , “The Colonial Origins of Comparative Development: An Empirical Investigation: Reply,” *American Economic Review*, October 2012, *102* (6), 3077–3110.
- , **Suresh Naidu, Pascual Restrepo, and James A. Robinson**, “Democracy, Redistribution and Inequality,” *Handbook of Income Distribution*, December 2014, *2*, 1885–1966.
- Adukia, Anjali**, “Sanitation and Education,” Technical Report 2014.
- Ahmed, Faisal**, “The Repression Effect,” Technical Report 2010.
- Anderson, Mary B.**, *Do no Harm: How can Aid Support Peace - or War*, Lynne Rienner Publishers, 1999.
- Barro, Robert J. and Jong Wha Lee**, “A new data set of educational attainment in the world, 1950–2010,” *Journal of Development Economics*, 2013, *104* (C), 184–198.
- Bartik, Timothy J.**, *Who Benefits from State and Local Economic Development Policies?* number wbsle. In ‘Books from Upjohn Press.’, W.E. Upjohn Institute for Employment Research, March 1991.
- Bauer, Peter T.**, *West African Trade: A Study of Competition, Oligopoly and Monopoly in a Changing Economy*, Cambridge University Press, 1954.
- Blattman, Christopher and Edward Miguel**, “Civil War,” *Journal of Economic Literature*, March 2010, *48* (1), 3–57.
- Boone, Peter**, “Politics and the effectiveness of foreign aid,” *European Economic Review*, 1996, *40* (2), 289–329.
- Card, David**, “Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration,” *Journal of Labor Economics*, January 2001, *19* (1), 22–64.
- Clemens, Michael, Steven Radelet, and Rikhil Bhavnani**, “Counting Chickens When They Hatch: The Short-term Effect of Aid on Growth,” Working Papers 44, Center for Global Development July 2004.



- Cohen, Daniel and Marcelo Soto**, “Growth and human capital: good data, good results,” *Journal of Economic Growth*, March 2007, 12 (1), 51–76.
- Crost, Benjamin, Joseph Felter, and Patrick Johnston**, “Aid under Fire: Development Projects and Civil Conflict,” *American Economic Review*, June 2014, 104 (6), 1833–56.
- Dalgaard, Carl-Johan, Henrik Hansen, and Finn Tarp**, “On The Empirics of Foreign Aid and Growth,” *Economic Journal*, 06 2004, 114 (496), F191–F216.
- de Waal, Alex**, *Famine Crimes: Politics and the Disaster Relief Industry in Africa*, Indiana University Press, 1997.
- Dixit, Avinash K and Joseph E Stiglitz**, “Monopolistic Competition and Optimum Product Diversity,” *American Economic Review*, June 1977, 67 (3), 297–308.
- Dollar, David and Craig Burnside**, “Aid, Policies, and Growth,” *American Economic Review*, September 2000, 90 (4), 847–868.
- Dube, Oeindrila and Suresh Naidu**, “Bases, Bullets, and Ballots: The Effect of U.S. Military Aid on Political Conflict in Colombia,” Working Papers 197, Center for Global Development January 2010.
- Easterly, William**, *The Elusive Quest for Growth: Economists’ Adventures and Misadventures in the Tropics*, Vol. 1 of *MIT Press Books*, The MIT Press, June 2002.
- , “Can Foreign Aid Buy Growth?,” *Journal of Economic Perspectives*, Summer 2003, 17 (3), 23–48.
- , **Ross Levine, and David Roodman**, “Aid, Policies, and Growth: Comment,” *American Economic Review*, June 2004, 94 (3), 774–780.
- Galiani, Sebastian, Stephen Knack, Lixin Colin Xu, and Ben Zou**, “The effect of aid on growth : evidence from a quasi-experiment,” Policy Research Working Paper Series 6865, The World Bank May 2014.
- Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Havard Strand**, “Armed Conflict 1946–2001: A New Dataset,” *Journal of Peace Research*, 2002, 39 (5), 615–637.
- Grimm, Michael and Anna L. Paffhausen**, “Evaluation Insights 9: Creating Jobs in Small Businesses,” Technical Report, Organization for Economic Cooperation and Development, May 2014.
- Hopenhayn, Hugo A**, “Entry, Exit, and Firm Dynamics in Long Run Equilibrium,” *Econometrica*, September 1992, 60 (5), 1127–50.
- Jarotschkin, Alexandra and Aart Kraay**, “Aid, disbursement delays, and the real exchange rate,” Policy Research Working Paper Series 6501, The World Bank June 2013.
- Ministry of Foreign Affairs, the Netherlands**, “Evaluation Insights 6: Rural Water and Sanitation,” Technical Report, Organization for Economic Cooperation and Development, July 2012.

- Nunn, Nathan and Nancy Qian**, “US Food Aid and Civil Conflict,” *American Economic Review*, June 2014, *104* (6), 1630–66.
- Polman, Linda**, *The Crisis Caravan: What’s Wrong with Humanitarian Aid?*, Lynne Rienner Publishers, 2010.
- Rajan, Raghuram G. and Arvind Subramanian**, “Aid and Growth: What Does the Cross-Country Evidence Really Show?,” *The Review of Economics and Statistics*, November 2008, *90* (4), 643–665.
- and – , “Aid, Dutch disease, and manufacturing growth,” *Journal of Development Economics*, January 2011, *94* (1), 106–118.
- Romer, Paul M.**, “Increasing Returns and Long-run Growth,” *Journal of Political Economy*, October 1986, *94* (5), 1002–37.
- Roodman, David**, “The Anarchy of Numbers: Aid, Development, and Cross-Country Empirics,” *World Bank Economic Review*, May 2007, *21* (2), 255–277.
- Sachs, Jeffrey D. and Andrew Warner**, “Economic Reform and the Process of Global Integration,” *Brookings Papers on Economic Activity*, 1995, *26* (1, 25th Anniversary), 1–118.
- Soderbom, Mans and Francis Teal**, “Are Manufacturing Exports the Key to Economic Success in Africa?,” *Journal of Development Economics*, January 2002, *94* (1), 106–118.
- Werker, Eric, Faisal Z. Ahmed, and Charles Cohen**, “How Is Foreign Aid Spent? Evidence from a Natural Experiment,” *American Economic Journal: Macroeconomics*, 2009, *1* (2), 225–44.

Table 1: Descriptive statistics

	General statistics				Mean according to expropriation risk			
	Mean	Standard deviation	Min	Max	Over median	Under median	Difference	t-stat
					expropriation risk	expropriation risk		
GDP per capita	3414.01	2766.44	558.73	13310.24	2015.032	5577.439	-3562.408	-4.65
GDP per capita en 2010	5275.52	4699.38	276.51	23122.88	3156.067	6740.474	-3584.407	-3.18
Protection against expropriation risk	6.35	1.23	3.5	8.27	5.24	7.39	-2.15	-11.17
Aid/GDP	.009	.014	.00014	.072	0.021	0.004	0.017	2.7
Aid shock	.0004	.001	-.0002	.005	.00079	.000044	.00074	2.84
$\lambda$	.012	.013	.00019	.052	0.01	0.01	.0007	0.223
Mean of annual projects	50.69	19.74	13.18	116.42	49	42.2	6.8	1.21
Battle deaths per capita in internal conflict	.000188	.0015	0	.03934	.00013	.00026	.00013	1.132
Number of countries	62	62	62	62	30	32		

Table 2: Share of world's annual aid per country

Country	Share of world's annual aid	Country	Share of world's annual aid
Angola	0.0061	Liberia	0.0050
Argentina	0.0031	Sri Lanka	0.0128
Burkina Faso	0.0093	Morocco	0.0154
Bangladesh	0.0281	Madagascar	0.0083
Bahamas, The	0.0000	Mexico	0.0063
Bolivia	0.0129	Mali	0.0107
Brazil	0.0091	Malta	0.0007
Chile	0.0034	Malaysia	0.0047
China	0.0400	Niger	0.0075
Cote d'Ivoire	0.0133	Nigeria	0.0253
Cameroon	0.0138	Pakistan	0.0306
Congo, Rep.	0.0067	Panama	0.0017
Colombia	0.0116	Peru	0.0116
Costa Rica	0.0030	Paraguay	0.0024
Dominican Republic	0.0031	Sudan	0.0057
Ecuador	0.0049	Senegal	0.0137
Egypt, Arab Rep.	0.0518	Singapore	0.0006
Ethiopia	0.0228	Sierra Leone	0.0037
Gabon	0.0023	El Salvador	0.0078
Ghana	0.0139	Suriname	0.0195
Guinea	0.0043	Togo	0.0025
Gambia, The	0.0011	Thailand	0.0297
Guinea-Bissau	0.0019	Trinidad and Tobago	0.0008
Guatemala	0.0069	Tunisia	0.0002
Hong Kong SAR, China	0.0002	Tanzania	0.0016
Honduras	0.0082	Uganda	0.0003
Indonesia	0.0425	Uruguay	0.0002
India	0.0481	Venezuela, RB	0.0014
Jamaica	0.0027	Vietnam	0.0012
Kenya	0.0192	South Africa	0.0097
Korea, Rep.	0.0053	Congo, Dem. Rep.	0.0267

Table 3: Main results

	Base sample, 1960-2011								
	4 year period			Assuming Conditional Convergence Coefficient					
	OLS	IV	IV	$\rho = 0.02$	$\rho = 0.04$	$\rho = 0.06$	$\rho = 0.08$	$\rho = 0.10$	$\rho = 0.12$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
<b>Panel A:</b> Dependent variable: per capita GDP growth rate (period average)									
Aid/GDP	0.64** (0.26)	-0.99 (0.73)	-8.22*** (1.28)	-3.67*** (1.02)	-5.66*** (1.48)	-7.66*** (2.17)	-9.65*** (2.92)	-11.64*** (3.70)	-13.64*** (4.50)
(Aid/GDP)*Inst	-0.11* (0.061)		1.65*** (0.27)	0.74*** (0.22)	1.14*** (0.33)	1.53*** (0.48)	1.93*** (0.65)	2.33*** (0.83)	2.72*** (1.00)
ln(initial GDP)	-0.017* (0.0098)	-0.076** (0.032)	-0.066** (0.027)						
Threshold level of institutions	5.82		4.98	4.95	4.98	4.99	5.00	5.00	5.01
Observations	717	717	717	717	717	717	717	717	717
Number of countries	62	62	62	62	62	62	62	62	62
Cragg-Donald	.	182	27.4	23.74	23.74	23.74	23.74	23.74	23.74
<b>Panel B:</b> First stage for:									
$\hat{Aid}/GDP$		Aid/GDP	(Aid/GDP)*I						
		2.348*** (0.397)	11.773*** (1.637)						
$(\hat{Aid}/GDP) * \hat{I}$		-0.332*** (0.060)	-1.757*** (0.247)						
ln(initial GDP)		-0.008* (0.004)	-0.043** (0.019)						
$R^2$		0.423	0.437						

Robust standard errors clustered at the country level in parenthesis. All columns include country and time fixed effects.  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4: Robustness checks

	Base sample, 1960-2011			
	Placebo	Outliers	Human cap	Latitude
	Test	Test	Test	Test
	(1)	(2)	(3)	(4)
Dependent variable: per capita GDP growth rate (period average)				
$(\hat{Aid}/GDP)$	-0.298 (1.09)			
$(\hat{Aid}/GDP) * \hat{I}$	-0.109 (0.19)			
$ln(initialGDP)_{t-1}$	-0.086*** (0.029)			
Aid/GDP		-8.88*** (1.40)	-7.71 (5.05)	-1.81* (1.01)
(Aid/GDP)*Institutions		1.79*** (0.31)		
(Aid/GDP)*Human Capital			2.40 (2.19)	-0.026 (0.13)
(Aid/GDP)*Latitude				-0.28 (2.82)
$ln(initialGDP)$		-0.068** (0.032)	-0.14** (0.070)	-1.103* (0.06)
Observations	592	621	618	575
Number of countries	62	54	53	56
Lagged dep. var.	Yes	No	No	No
Cragg-Donald		24.1	21.2	64.5

Robust standard errors clustered at the country level in parenthesis.  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5: Conflict analysis

	Base sample, 1960-2011								
	4 year period			Assuming AR(1) coefficient					
	OLS	IV	IV	$\rho = 0$	$\rho = 0.05$	$\rho = 0.1$	$\rho = 0.15$	$\rho = 0.20$	$\rho = 0.25$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Dependent variable: Battle deaths per capita in internal conflict									
Aid/GDP	-0.002 (0.004)	0.003 (0.004)	0.062*** (0.013)	0.057*** (0.013)	0.059*** (0.012)	0.051*** (0.011)	0.044*** (0.010)	0.037*** (0.009)	0.030*** (0.008)
(Aid/GDP)*Inst	0.000 (0.001)		-0.013*** (0.003)	-0.012*** (0.003)	-0.013*** (0.002)	-0.011*** (0.002)	-0.010*** (0.002)	-0.008*** (0.002)	-0.006*** (0.002)
Lagged battle deaths per capita in internal conflict	0.031 (0.029)	0.030 (0.027)	0.024 (0.028)						
ln(initial GDP)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Threshold level of institutions	3.80		4.66	4.70	4.66	4.63	4.62	4.60	4.58
Observations	662	662	662	717	662	662	662	662	662
Number of countries	62	62	62	62	62	62	62	62	62
Cragg-Donald	.	163.82	23.84	27.35	24.32	24.32	24.32	24.32	24.32

Robust standard errors clustered at the country level in parenthesis. All columns include country and time fixed effects.  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Aid by Sector, 2013

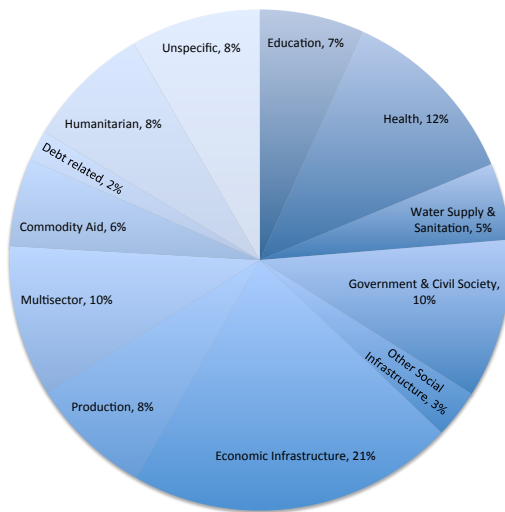


Figure 1: Distribution of Total Aid by Sector, 2013. Source: OECD DAC.

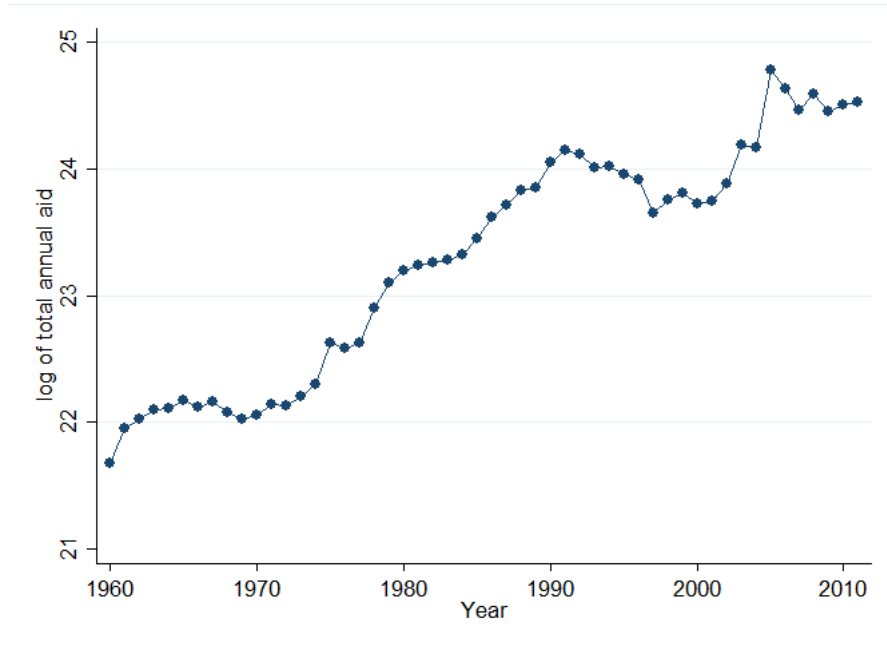


Figure 2: Total Aid Granted per Year. Source: OECD DAC.

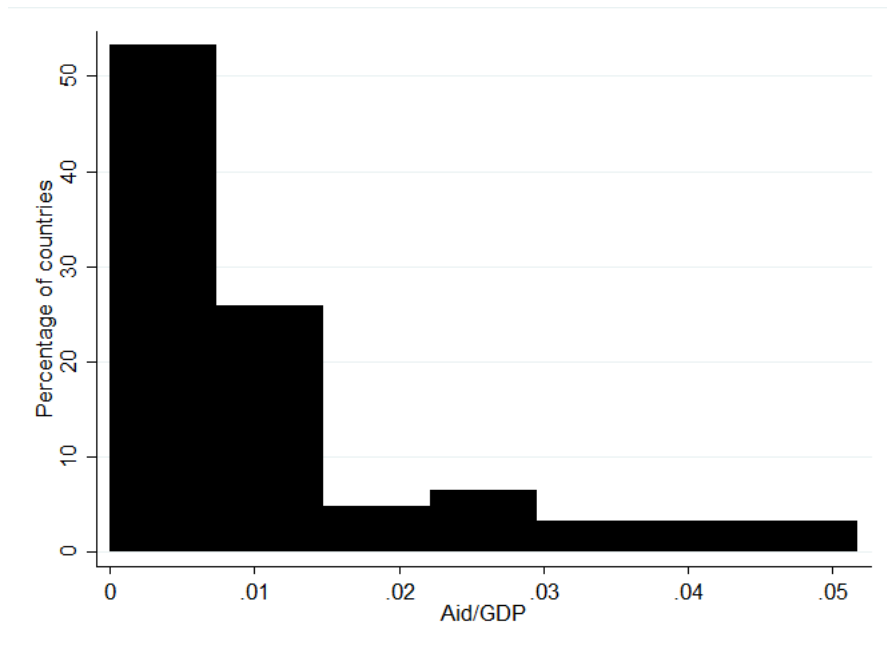


Figure 3: Distribution of Aid to GDP per Country. Source: OECD DAC.



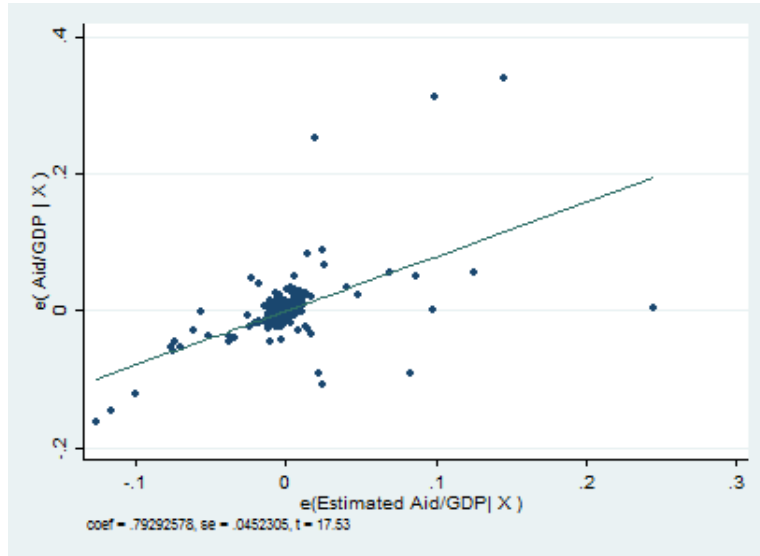


Figure 4: Regression of aid to GDP on our instrument, controlling for country and time fixed effects.

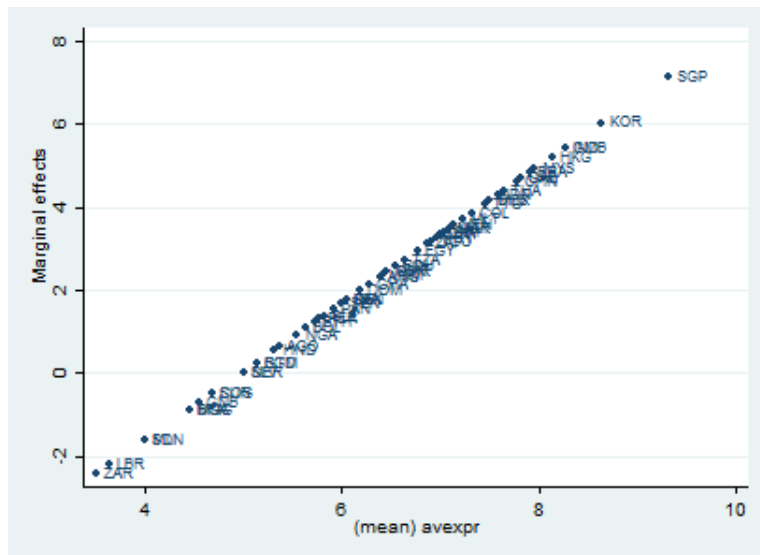


Figure 5: Marginal Effects of Aid on Growth in Different Countries

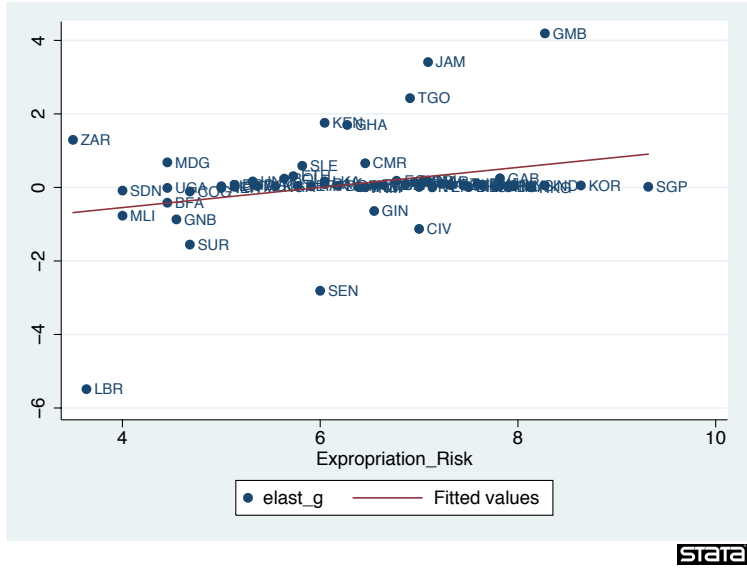


Figure 6: Elasticity of Growth Rates to the Ratio of Aid to GDP

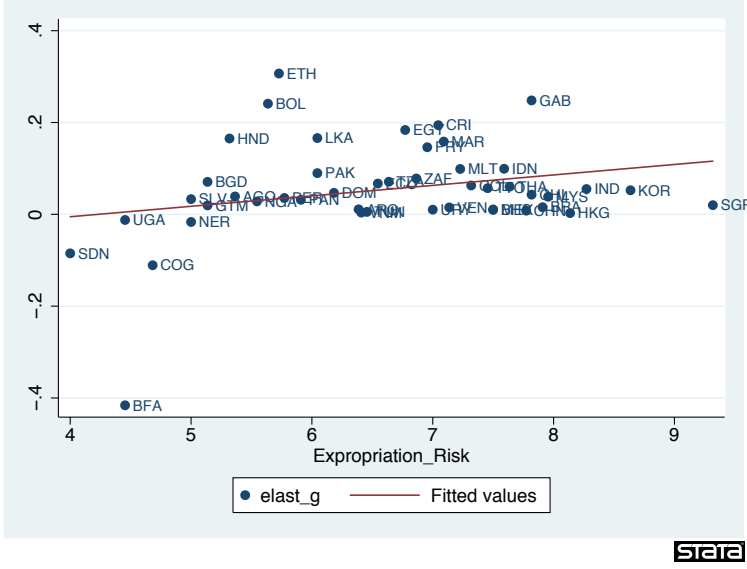


Figure 7: Elasticity of Growth Rates to the Ratio of Aid to GDP Excluding Countries with Large Elasticities

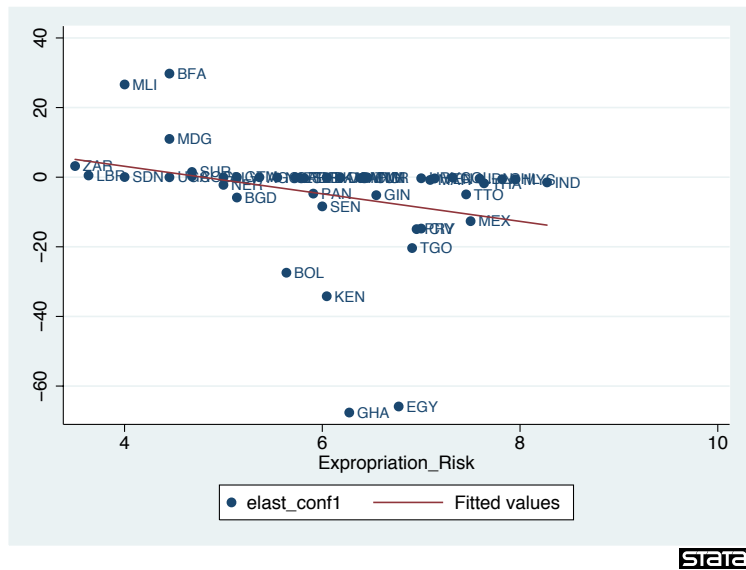


Figure 8: Elasticity of Conflict to the Ratio of Aid to GDP

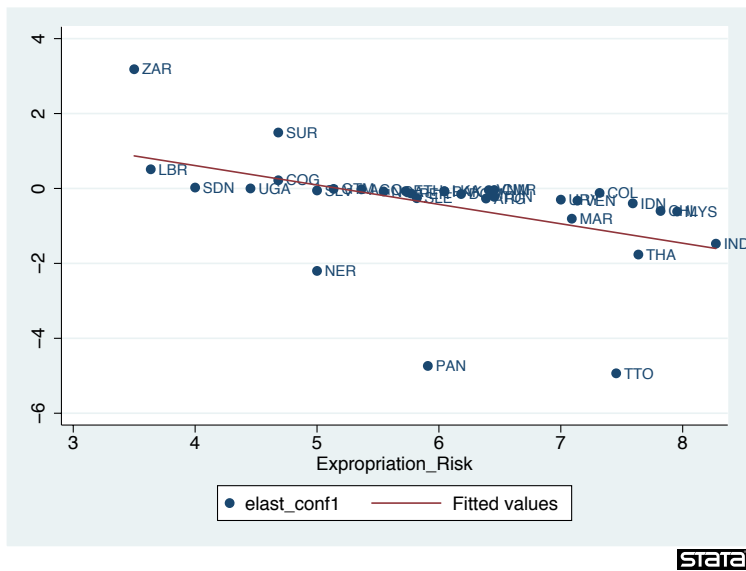


Figure 9: Elasticity of Conflict to the Ratio of Aid to GDP Excluding Countries with Large Elasticities