Ethnic Fractionalisation and Aid Effectiveness

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Abstract

We test the hypothesis that the effect of foreign aid on economic growth is positive in ethnically homogenous countries, but decreasing in ethnic frac-tionalisation. Using panel data covering 114 aid-recipient countries over the period 1962 to 2001, and employing two-stage least squares and GMM estimation techniques, we find a strong support for this hypothesis. Our estimates suggest that foreign aid promotes growth in ethnically homogenous countries, while being ineffective or even harmful in many Sub-Saharan African countries and some ethnically fractionalised countries elsewhere.

JEL classification: C23, F35, F43, O11

1. Introduction

Economists and political activists from Jeffrey Sachs to Bono have long argued that foreign aid has various positive effects on economic development (Sachs, 2005). Recent contributions scrutinising the voluminous aid-effectiveness literature however find no robust evidence for a positive effect of foreign aid on economic growth (Doucouliagos and Paldam, 2008; Rajan and Subramanian, 2008). In at least some recipient countries,

foreign aid must thus have indirect negative effects on economic growth that offset any positive growth effects.

Svensson (2000) and Hodler (2006) present theoretical models in which rivalling ethnic groups can divert time and resources away from productive to rent-seeking activities. These rent-seeking activities are socially wasteful, but help to channel aid inflows or other public funds towards one's own group.[1] They may include bribery and corruption, lobbying and political campaigning, distorted policies as well as intimidation or even violence and civil warfare. Focusing on the best equilibrium that can be sustained by trigger strategies in a repeated game, Svensson (2000) shows that an increase in aid inflows induces all groups to engage in more rent seeking to ensure that deviations remain unprofitable. His model thus predicts that there are 'surprisingly small or in fact even contractible effects on welfare and public project provision following increased inflows of foreign aid' (Svensson, 2000, p. 445) in heterogeneous societies. Consistent with his model's predictions, he finds evidence that foreign aid tends to raise corruption in ethnically fractionalised, but not in ethnically homogenous countries.[2]

Hodler (2006) adds the assumption that property rights on produced output are endogenous and their quality decreasing in the share of aggregate resources devoted to rent-seeking activities. Focusing on the one-shot version of the game, he finds that foreign aid has a direct positive effect on economic development and an indirect negative effect as foreign aid increases rent seeking and erodes property rights, thereby making productive activities even less attractive. The magnitude of the direct positive effect is independent of the number of rivalling groups, but the indirect negative effect becomes larger as the the number of rivalling groups increases. The reason is that the increase in aggregate rent seeking that follows higher aid inflows is the larger, the more rivalling groups there are. As a consequence, the model predicts that the net effect of foreign aid on economic development is positive if the number of rivalling

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[1] Hodler (2006) focuses on natural resource rents rather than foreign aid. However, windfall gains in the forms of resource rents and (unconditional) aid inflows are likely to have similar effects on a country's economy, its institutions and the political situation, as argued by Acemoglu *et al.* (2004), Hodler (2006), Dalgaard and Olsson (2008) and many others. For dynamic models of rent seeking and windfall gains, see Lane and Tornell (1996), Tornell and Lane (1999) and Hodler (2007).

[2] Knack (2001), Alesina and Weder (2002), Bräutigam and Knack (2004) and Djankov *et al.* (2008) provide further evidence that foreign aid can foster corruption and undermine the quality of institutions and governance.

groups is low, but decreases in the number of rivalling groups and becomes negative if this number gets sufficiently large.

The models of Svensson (2000) and Hodler (2006) predict that the effect of foreign aid on economic development should be clearly positive in ethnically homogenous countries, but smaller or even negative in countries with many rivalling ethnic groups.[3] In this paper, we test this hypothesis using panel data covering 114 aid recipient countries over the period 1962 to 2001. We are interested in the growth effects of both foreign aid and its interaction with the index of ethnic fractionalisation, which serves as our proxy for the number of rivalling ethnic groups. Employing two-stage least squares and generalised method of moments (GMM) estimation techniques, we find a positive coefficient on foreign aid and a negative coefficient on the interaction term. These findings, which survive various robustness exercises, support our hypothesis. Our estimates suggest that foreign aid is effective in promoting economic growth in relatively ethnically homogenous countries, but that many Sub-Saharan African countries (and a few countries in Latin America and elsewhere) are so ethnically fractionalised that foreign aid is likely to be ineffective or even harmful.

This latter implication is reconcilable with the political reality in various Sub-Saharan African countries. In Kenya, for example, there has long been fierce political competition along ethnic lines, and numerous members of the Kalenjin-dominated government around Daniel arap Moi, who was president from 1978 to 2002, and the Kikuyu-dominated government around Mwai Kibaki, who has been president ever since, have extracted foreign aid and other public funds on a large scale (Wrong, 2009).

Our paper contributes to the aid effectiveness literature, in particular its newer branch, the so-called conditional aid effectiveness literature (Doucouliagos and Paldam, 2010), which studies the conditions under which foreign aid is effective (rather than whether or not foreign aid is effective in an average country). Despite some doubts about the robustness of their findings, Burnside and Dollar (2000) must be credited for initiating the conditional aid effectiveness literature.[4] Major contributions to this

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[3] While Svensson (2000) and Hodler (2006) both focus on rivalling groups divided along ethnic lines in their empirical applications, their theoretical models can also represent situations in which rivalling groups differ in some other characteristics. We however choose to follow Svensson (2000) and Hodler (2006) in focusing on rivalling ethnic groups.

[4] Studies questioning the robustness of the Burnside and Dollar (2000) findings include Hansen and Tarp (2000, 2001), Dalgaard and Hansen (2001), Lensink and White

literature include Hansen and Tarp (2000, 2001), Dalgaard *et al.* (2004) and Angeles and Neanidis (2009).[5] Hansen and Tarp find diminishing returns to foreign aid, i.e., a negative coefficient on aid squared.[6] Dalgaard and his co-authors find that aid is more effective outside the tropics than within. In particular, they find a positive coefficient on aid, but a negative coefficient on the interaction term between aid and the fraction of a country's area located in the tropics. Angeles and Neanidis hypothesise that aid effectiveness depends on the size of the local elite, which they proxy by the share of colonial settlers.[7] They indeed find a positive coefficient on aid, but a negative coefficient on the interaction term between aid and the share of colonial settlers.

We compare our results to these findings. We find that the interaction term between aid and ethnic fractionalisation tends to be more robust than an aid-squared term and the interaction term between aid and the fraction of a country's area located in the tropics. We also find evidence that ethnic fractionalisation and the share of colonial settlers both lower aid effectiveness. Inspired by Caselli and Coleman (2006), we argue that this latter finding may suggest that rent-seeking contests for aid inflows do not only get more detrimental as the number of ethnic groups raises, but also as the differences in physical appearance across the major ethnic groups grow larger.

Our paper also relates to the literature on the consequences of ethnic diversity for economic development. Easterly and Levine (1997) find that ethnic fractionalisation may be responsible for Sub-Saharan Africa's poor growth performance by causing rent seeking, poor policies and weak institutions.[8] We also find that ethnic fractionalisation has a significantly

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(2001), Easterly *et al.* (2004), Roodman (2004, 2007), Jensen and Paldam (2006) and Doucouliagos and Paldam (2010).

[5] Doucouliagos and Paldam (2010) and Roodman (2004, 2007) discuss various contributions to the conditional aid effectiveness literature. Roodman's robustness exercises suggest that the findings of Hansen and Tarp (2001) and Dalgaard *et al.* (2004) tend to be more robust than other findings in this literature. These robustness exercises do however not include the most recent contributions, e.g., Angeles and Neanidis (2009) and also not all of the earlier contributions, e.g., Ovaska (2003).

[6] See also Dalgaard and Hansen (2001) and Lensink and White (2001).

[7] Bjørnskov (2009) studies in what circumstances foreign aid benefits the local elite.

[8] La Porta *et al.* (1999) and Alesina *et al.* (2003) also find that ethnic fractionalisation leads to poor policy outcomes and bad governance; and Miguel and Guerty (2005) illustrate the negative effect of ethnic divisions on the provision of local public goods in rural Kenya.

negative effect on economic growth in specifications in which we exclude the interaction term of foreign aid and ethnic fractionalisation. But whenever we include this interaction term, ethnic fractionalisation by itself becomes insignificant. Hence, our results suggest that ethnic heterogeneity is not in and of itself detrimental to economic growth, but lowers the effectiveness of foreign aid.

The remainder of this paper is structured as follows: Section 2 discusses our empirical methodology and the data. Section 3 presents our main results and various robustness exercises. Section 4 concludes.

2. Methodology and data

We employ panel data covering 114 aid-recipient countries over the period 1962 to 2001.[9] We use four-year averages of our measures of foreign aid and economic growth. To test whether the aid–growth relationship varies systematically with ethnic fractionalisation, we estimate the following model:

$$\text{GROWTH}_{it} = \alpha + \beta_1 \text{AID}_{it} + \beta_2 \text{ETHNIC}_i + \beta_3 (\text{AID}_{it} \times \text{ETHNIC}_i)$$
$$+ X'_{it}\Lambda + \varepsilon_{it},$$

where GROWTH_{it} is the average growth rate of real per capita GDP in country i from year t to year $t + 3$, AID_{it} a measure of average yearly aid inflows in this period, ETHNIC_i an index of ethnic fractionalisation and X_{it} a vector of other control variables.

We are mainly interested in the effect of a change in AID_{it} on GROWTH_{it}. The point estimate of this effect is $\beta_1 + \beta_2\text{ETHNIC}_i$. Our hypothesis suggests that β_1 should be significantly positive and β_2 should be significantly negative. The point estimates would then imply that GROWTH_{it} is increasing in AID_{it} if ETHNIC_i is below the threshold of $-\beta_1/\beta_2$, but decreasing in AID_{it} otherwise.

We use the measures of GROWTH_{it} and AID_{it} from the extensive data set compiled by Roodman (2004).[10] This data set contains three measures of aid inflows: Effective development assistance (EDA) relative to real GDP, net overseas development assistance (ODA) relative to real GDP and ODA relative to exchange rate GDP, i.e., GDP converted to US dollars using market exchange rates rather than purchasing power parities (PPP). The

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[9] Due to data limitations, the panel is unbalanced and not all specifications cover exactly 114 countries.

[10] Appendix A provides definitions and sources of all variables used.

Table 1: Summary Statistics

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
$GROWTH_{it}$	763	0.013	0.042	−0.425	0.165
AID_{it}	763	0.014	0.024	−0.005	0.237
$ETHNIC_i$	114	0.492	0.261	0.000	0.930

EDA data correct for a number of short-comings in the ODA data and should therefore be conceptually superior in measuring the true aid element of grants and loans (Chang *et al.*, 1998). We follow the recent literature by using EDA-to-real GDP (AID_{it}) in our baseline specifications, and ODA-to-real GDP (ODA_{it}^R) as well as ODA-to-exchange rate GDP (ODA_{it}^X) to check the robustness of our results.

We use the index of ethnic fractionalisation ($ETHNIC_i$) by Alesina *et al.* (2003) to proxy for the number of rivalling ethnic groups. This index measures the probability that two randomly selected individuals of a particular country belong to different ethno-linguistic groups. Hence, higher scores indicate a more fractionalised country. This index is only available as a cross section, but we are not concerned by this because the ethnic composition of countries tends to be very slow moving (Alesina *et al.*, 2003). We also use the similarly constructed indices of linguistic and religious fractionalisation ($LANGUAGE_i$ and $RELIGION_i$). Table 1 provides summary statistics for our three main variables — $GROWTH_{it}$, AID_{it} and $ETHNIC_i$ — based on all observations used in our baseline specifications.

Following the literature, our control variables include 'initial' real PPP-adjusted GDP per capita in year t (GDP_{it}), and a dummy variable for the fast-growing East Asian countries.[11] Over the period 1962 to 2001, the average growth rate in these countries was close with 5% compared with 1% in the rest of the sample.

Many studies in the aid effectiveness literature further add control variables that proxy for fiscal, monetary and trade policies, institutional quality, political stability and governance. We refrain from adding such control variables. The models of Svensson (2000) and Hodler (2006) suggest that the rent-seeking activities caused by aid inflows into ethnically diverse countries go hand-in-hand with poor policies and may lead to a

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[11] This dummy, which is also taken from Roodman (2004), is equal to one for China, Indonesia, South Korea, Malaysia, Philippines, Singapore and Thailand.

deterioration in institutional quality. The resulting rent-seeking contestsare also likely to be associated with political instability and bad governance. These models therefore predict that, in fractionalised countries, foreign aid has an indirect negative effect on economic growth, which may well work via rent seeking, poor policies, bad governance, political instability and weak institutions. We can therefore only test our hypothesis whether we exclude these variables. Otherwise, we *would* be testing whether ethnic fractionalisation impacts upon the aid–growth relationship through some channel unrelated to policies, governance, political stability and institutional quality.

For similar reasons, we follow the literature in not controlling for investment in our main specification. Investment is a very proximate cause of economic growth (e.g., Rodrik, 2003). When controlling for investment, one *would* test whether ethnic fractionalisation impacts upon the aid–growth relationship through some channel that leaves investment unaffected. However, we would like to test whether ethnic fractionalisation impacts upon the aid–growth relationship in general, i.e., including through all the channels that affect investment. We can only test this latter hypothesis when we exclude investment from our main specification. We however return to the role of investment below.

To reduce the possibility of omitted variables biasing the relationship between aid and growth, we add year dummies to account for time varying common shocks, and regional dummies to control for regional fixed effects (both of which are omitted in most other contributions to the aid effectiveness literature).[12] The instrumental variables approach that we adopt will also help to identify the causal relationship between aid and growth.

As a positive side-effect of excluding policy, governance and institutional variables, our sample contains a larger cross section of countries than previous studies. Our baseline specifications are based on 763 observations from 114 countries, while the baseline specification is based on, for example, 275 observations from 56 countries in Burnside and Dollar (2000), and 449 observations from 67 countries in Angeles and Neanidis (2009). As policy, governance and institutional variables tend to be missing more often for countries with poor policies, bad governance,

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[12] The regions are East Asia and the Pacific, Eastern Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia and Sub-Saharan Africa. Given that we follow the literature by including a dummy for the fast-growing East Asian countries (see above), we are in fact dividing East Asia and the Pacific into two groups: the fast-growing East Asian countries and the rest.

weak institutions and low growth rates, we expect our results to be less prone to sample selection bias than those of previous studies.

The potential endogeneity of foreign aid has been the main challenge in the empirical aid effectiveness literature. We follow the literature in choosing estimation techniques that help to address this potential endogeneity. The first technique that we use is two-stage least squares (2SLS). Following the literature (e.g., Boone, 1996; Burnside and Dollar, 2000; Hansen and Tarp, 2001; Dalgaard *et al.*, 2004; Angeles and Neanidis, 2009), we use as instruments for AID_{it} a dummy for the Franc zone (FRZ_i), a dummy for Central American countries (CAM_i), a dummy for Egypt (EGY_i), arms imports divided by GDP ($ARMS_{it}$) and log population size (POP_{it}). These instruments are inspired by various studies, showing that strategic and cultural ties are important determinants of aid flows. Countries in the Franc zone and Central America receive more aid from France and the USA, respectively, for cultural reasons unrelated to economic performance, while Egypt receives more aid for geopolitical reasons. Donors also tend to give more aid per capita to small countries as well as to countries that have arms deals with them, again for reasons unrelated to economic performance. We deviate from most of the literature by not using lagged aid as an instrument in our 2SLS estimates, as average growth in, say, the period from 1998 to 2001 may well depend on aid inflows in, say, 1997, which would violate the instrument exogeneity requirement. To ensure that our set of instruments is sufficiently strong despite dropping lagged aid, we add quadratics of $ARMS_{it}$ and POP_{it}.[13] Since, we need to instrument for AID_{it} as well as its interaction with $ETHNIC_i$, we also add $ARMS_{it} \times ETHNIC_i$ and $POP_{it} \times ETHNIC_i$ to our set of instruments.[14]

We further address the potential endogeneity of foreign aid also by using the generalised method of moments GMM panel estimators of Arellano and Bond (1991) and Blundell and Bond (1998). These estimators have become increasingly popular in the aid effectiveness literature (e.g., Hansen and Tarp, 2001; Dalgaard *et al.*, 2004; Roodman, 2004; Rajan and Subramanian, 2008; Angeles and Neanidis, 2009). They make use of standard instruments, such as those discussed above, but expand the instrument set to improve the efficiency of the first-stage regression. The

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[13] Dividing arms imports by GDP rather than total imports also helps to avoid weak instrument problems.

[14] Further adding $ARMS_{it}^2 \times ETHNIC_i$ and $POP_{it}^2 \times ETHNIC_i$ to our set of instruments does not lead to any noticeable change in our results.

Arellano−Bond estimator converts endogenous variables into first differences and uses lagged levels of the endogenous variables to instrument for these differences, which is why it is commonly referred to as the difference-GMM estimator. The Blundell−Bond estimator adds the levels of the endogenous variables to the system to be instrumented and uses the lagged first differences as additional instruments. This is known as the system-GMM estimator.[15] We apply these GMM estimators using a two-step estimation process, which tends to be more efficient than a one-step process, and the Windmeijer (2005) finite-sample correction to adjust the standard errors. To avoid dynamic panel bias, we treat AID_{it} and $AID_{it} \times ETHNIC_i$ as well as GDP_{it} as endogenous variables.[16]

Besides addressing the potential endogeneity of aid, these GMM estimators have the added advantage that they 'incorporate (implicitly) fixed effects' (Rajan and Subramanian, 2008, p. 644). The possibility to control for unobserved country-specific heterogeneity is particularly valuable in our study, in which we cannot control for policy and governance variables because of the hypothesized channels through which ethnic fractionalisation impacts upon aid effectiveness.

When employing these GMM panel estimators, we use only endogenous variables that are lagged at least twice as instruments. When the number of lags of the endogenous variables used as instruments is otherwise unrestricted, GMM panel estimators may create numerous instruments that 'can overfit the instrumented variables' (Roodman, 2004, p. 25). Therefore, we mostly use only the second and third lags of the endogenous variables as instruments, but we also report the results when using all endogenous variables lagged at least twice, and when collapsing the set of instruments using the method proposed by Roodman (2009).

3. Findings

Table 2 presents our main results using pooled OLS and, more importantly, 2SLS. In Columns 1 and 2 we look at the effects of AID_{it} and $ETHNIC_i$ on $GROWTH_{it}$ in the absence of the interaction term $AID_{it} \times ETHNIC_i$. We find that the effect of AID_{it} is not significantly different from zero, while $ETHNIC_i$ has a significant negative effect. The former result suggests

[15] These estimators both have their limitations. The difference-GMM estimator often leads to a weak instruments problem, while the system-GMM is only valid if the lagged differences are orthogonal to the fixed effects.

[16] This implies that we use lagged aid as instrument for current aid in our GMM estimates.

Table 2: Main results (OLS and 2SLS)

Dependent variable	(1) OLS GROWTH$_{it}$	(2) 2SLS GROWTH$_{it}$	(3) OLS GROWTH$_{it}$	(4) 2SLS GROWTH$_{it}$	(5) 2SLS GROWTH$_{it}$	(6) 2SLS GROWTH$_{it}$	(7) 2SLS INV$_{it}$
AID$_{it}$	−0.170	0.223	0.507	1.399	1.249	2.000	6.125
	(0.465)	(0.202)	(0.176)	(0.034)	(0.044)	(0.028)	(0.030)
ETHNIC$_i$	−0.031	−0.031	−0.016	−0.005	−0.007	0.004	0.035
	(0.000)	(0.000)	(0.158)	(0.750)	(0.635)	(0.841)	(0.588)
AID$_{it}$*ETHNIC$_i$			−1.066	−1.874	−1.822	−2.636	−6.771
			(0.139)	(0.053)	(0.058)	(0.051)	(0.081)
GDP$_{it}$	−0.001	0.004	−0.002	0.003	−0.001	0.002	0.047
	(0.836)	(0.369)	(0.750)	(0.554)	(0.896)	(0.632)	(0.004)
Year dummies	YES	YES	YES	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES	YES	YES	YES
Implied threshold $-\beta_1/\beta_3$			(0.48)	0.75	0.69	0.76	0.90
Countries	114	114	114	114	114	92	114
Observations	763	763	763	763	752	626	763
R^2	0.158	0.200	0.176	0.209	0.239	0.188	0.199
Hansen J-test (p-value)	—	0.244	—	0.342	0.484	0.321	0.798
Omitted observations					Statistical outliers	Countries with low or high ETHNIC$_i$	

Notes: p-values in parentheses are based on robust and clustered standard errors. In all 2SLS regressions, exogenous variables used as instruments include FRZ$_i$, CAM$_i$, EGY$_i$, POP$_{it}$, POP$_{it}^2$, ARMS$_{it}$ and ARMS$_{it}^2$. In addition, POP$_{it}$*ETHNIC$_i$ and ARMS$_{it}$*ETHNIC$_i$ are used in Columns 4–7. In Column 5, outliers are removed using the Hadi (1992) procedure (see footnote 21 for details). The outliers are GAB 1974–1977; GNB 1974–1977, 1982–1985, 1986–1989; IRQ 1990–1993; JOR 1974–1977, 1978–1981, 1982–1985; LBR 1990–1993, 1998–2001 and SOM 1974–1977. In Column 6, countries with ETHNIC$_i$ below the 10th or above the 90th percentile are omitted.

that foreign aid has no effect in an average aid-recipient country, which is consistent with the findings of various recent contributions to the aid effectiveness literature (Doucouliagos and Paldam, 2008; Rajan and Subramanian, 2008); and the latter result is consistent with the findings of Easterly and Levine (1997), who argue that ethnic divisions may be responsible for Sub-Saharan Africa's poor growth performance. In addition, the effect of GDP_{it} is also insignificant.[17]

In Column 3, we use pooled OLS to estimate our baseline specification, which includes the interaction term $AID_{it} \times ETHNIC_i$. The coefficients on AID_{it} and the interaction term have the predicted signs, but are statistically insignificant. In Column 4, we address the potential endogeneity of AID_{it} and $AID_{it} \times ETHNIC_i$ using 2SLS with the set of instruments discussed in the previous section. The Hansen J-test is often used to assess the validity of the instruments. We cannot reject the null hypothesis that the excluded instruments are uncorrelated with the error term and, therefore, exogenous.[18] We find that the coefficient on AID_{it} is positive and statistically significant (with a p-value of 0.034), while the coefficient on $AID_{it} \times ETHNIC_i$ is negative and statistically significant (with a p-value of 0.053). These results support our hypothesis. In particular, the former result suggests that the effect of AID_{it} on $GROWTH_i$ is unambiguously positive in ethnically homogenous countries (where $ETHNIC_i = 0$), while the later result suggests that the effect of AID_{it} on $GROWTH_{it}$ decreases in $ETHNIC_i$. In Figure 1, following Brambor et al. (2006), we present the effect of AID_{it} on $GROWTH_{it}$ as well as the associated standard errors for all possible levels of $ETHNIC_i$. The effect of AID_{it} on $GROWTH_{it}$ is significantly positive for low levels of $ETHNIC_i$, but becomes insignificant for high levels of $ETHNIC_i$. The point estimates suggest that this effect turns negative once $ETHNIC_i$ exceeds the threshold level of 0.75. This is the case in 21 of the 114 countries in our baseline sample, including 20 of the 43 Sub-Saharan African countries. In these countries, the positive

[17] In all OLS and 2SLS estimates presented in the paper, the coefficients on the dummies for the first four 4-year periods tend to be higher than the dummies for the six later 4-year periods. Moreover, when omitting the dummy for Sub-Saharan African countries, then the dummy for the fast-growing East Asian countries is positive and highly significant, and the South Asia dummy is also positive and significant in most specifications, while all other regional dummies are insignificant.

[18] Also the Anderson canonical correlations LR test is sometimes used to assess the relevance of the instruments. In all 2SLS estimates presented in this paper, the null hypothesis can be easily rejected, which suggests that the models are identified and the instruments relevant.
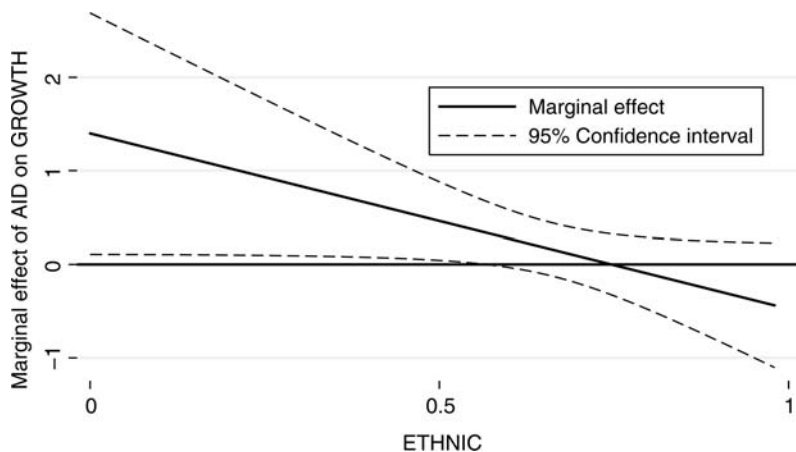
Figure 1: Aid Effectiveness and Ethnic Fractionalisation (2SLS Estimates)

effects of foreign aid are presumably offset by the negative consequences of the provoked rent-seeking contests among rivalling ethnic groups.

To get an idea how sizeable the effect of ethnic fractionalisation on aid effectiveness is, let us first consider the case of Uganda. Uganda is the most ethnically fractionalised country in the world with $ETHNIC_{UGA} = 0.930$. Over the period 1998 to 2001, it received EDA equal to only 1.2% of its GDP, and its average yearly growth rate was 2.5%. Our point estimates suggest that the contribution of these aid inflows to its growth rate was -0.4%, i.e., that Uganda would have grown at a rate of 2.9% in the absence of foreign aid. However, the contribution of these aid inflows to its growth rate would have been 0.6% if Uganda were about as ethnically fractionalised as the average country in our sample (such as Nicaragua or Venezuela), and even 1.7% if Uganda were perfectly ethnically homogenous (such as Comoros).[19]

Sierra Leone is another highly fractionalised country with $ETHNIC_{SLE} = 0.820$. In the 1980s, Sierra Leone was a country strongly influenced by tribal and power politics, where corruption and rent seeking were allegedly rife (Reno, 1995). In the period 1986 to 1989, EDA inflows averaged 1.5% of GDP. Over this period, real GDP on average declined by 1.6% a year. According to our estimates, these aid inflows may have contributed to declining GDP by adding to the incentives to engage in rent-seeking activities, with aid inflows estimated to have

[19] These contributions are calculated as follows: $(1.399 - 1.874 \times 0.930)0.012 = -0.004$, $(1.399 - 1.874 \times 0.492)0.012 = 0.006$, and $1.399 \times 0.012 = 0.017$.

contributed -0.2% a year to growth. In comparison, if Sierra Leone had been as ethnically fractionalised as the average country, aid would have raised the growth by 0.7% a year, and even by 2.1% with perfect ethnic homogeneity.[20] These counterfactuals highlight that the effect of ethnic fractionalisation on aid effectiveness is not only statistically, but also economically significant.

While we are mainly interested in the effects of AID_{it} and $AID_{it} \times ETHNIC_i$ on $GROWTH_{it}$, it is also noteworthy that $ETHNIC_i$ becomes insignificant whenever the interaction term $AID_{it} \times ETHNIC_i$ is included. This result suggests that ethnic heterogeneity in and of itself does not have a negative effect on economic growth, but acts to lower the effectiveness of foreign aid.

In Column 5, we account for the possibility that outliers may drive our results by using the Hadi (1992) procedure to identify and remove outliers. In the absence of outliers, the coefficients of interest are of similar magnitude and statistical significance as and when the full sample is used.[21] In Column 6, we omit the 10% least and the 10% most ethnically fractionalised countries from our sample. We again find that the coefficients of interest remain significant, and they become even somewhat larger in magnitude.

As investment is generally seen as a very proximate determinant of economic growth, we expect AID_{it} and $AID_{it} \times ETHNIC_i$ to have qualitatively similar effects on investment (INV_{it}) as they have on economic growth. This is confirmed by the results in Column 7, where the dependent variable is INV_{it} rather than $GROWTH_{it}$.

Table 3 presents our main results using GMM estimation techniques to address the potential endogeneity of foreign aid as well as to account for country-specific unobserved heterogeneity. In Columns 1 and 2, we employ the system-GMM estimator using only the second and third lags of the endogenous variables as instruments. The Hansen J-test suggests in both cases that the exogeneity of the instruments cannot be rejected;

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[20] These contributions are calculated as follows: $(1.399-1.874 \times 0.820)0.015 = -0.002$, $(1.399-1.874 \times 0.492)0.015 = 0.007$ and $1.399 \times 0.015 = 0.021$.

[21] The Hadi (1992) procedure is used by, e.g., Roodman (2004) and Angeles and Neanidis (2009). We use a 5% significance level to remove outliers to the partial scatter plot of $GROWTH_{it}$ against the predicted values of $AID_{it} \times ETHNIC_i$ after projection onto the instruments. The countries with most outliers are Guinea-Bissau and Jordan (as noted in Table 2). Our results also survive if we only exclude any or both of these two countries, or if we use other standard tests for outliers based on Cook's Distance, DFITS and the standardized residuals.

Table 3: Main Results (GMM)

Dependent variable	(1) GMM (SYS) GROWTH$_{it}$	(2) GMM (SYS) GROWTH$_{it}$	(3) GMM (SYS) GROWTH$_{it}$	(4) GMM (SYS) GROWTH$_{it}$	(5) GMM (SYS) GROWTH$_{it}$	(6) GMM (DIFF) GROWTH$_{it}$	(7) GMM (SYS) INV$_{it}$
AID$_{it}$	−0.036	0.776	0.697	0.718	1.395	1.658	2.111
	(0.765)	(0.005)	(0.036)	(0.009)	(0.000)	(0.105)	(0.004)
AID$_{it}$*ETHNIC$_i$		−1.577	−1.220	−1.407	−2.212	−3.111	−3.730
		(0.001)	(0.009)	(0.005)	(0.002)	(0.072)	(0.011)
GDP$_{it}$	0.002	−0.002	−0.003	−0.002	0.001	−0.020	0.053
	(0.637)	(0.524)	(0.371)	(0.603)	(0.915)	(0.111)	(0.000)
Year dummies	YES	YES	YES	YES	YES	YES	YES
Regional dummies	NO	NO	NO	NO	NO	NO	NO
Implied threshold $-\beta_1/\beta_2$		0.49	0.57	0.51	0.63	(0.53)	0.57
Countries	114	114	92	114	114	107	114
Observations	763	763	626	763	763	649	763
Hansen *J*-test (*p*-value)	0.245	0.470	0.572	0.495	0.117	0.333	0.488
AR(2) test (*p*-value)	0.930	0.833	0.975	0.855	0.753	0.517	0.021
GMM instrument count	36	56	56	76	34	58	56
Lags of endogenous variables used as instruments	Two and three lags	Two and three lags	Two and three lags	Unrestricted starting with two lags	Unrestricted starting with two lags and collapsed set	Unrestricted starting with two lags	Two and three lags
Omitted observations			Countries with low or high ETHNIC$_i$				

Notes: *p*-values in parentheses are based on robust standard errors and the Windmeijer (2005) finite-sample correction. In all columns, exogenous variables used as instruments include FRZ$_i$, CAM$_i$, EGY$_i$, POP$_{it}$, POP$^2_{it}$, ARMS$_{it}$ and ARMS$^2_{it}$. In addition, POP$_{it}$*ETHNIC$_i$ and ARMS$_{it}$*ETHNIC$_i$ are used in Columns 2–7. In Column 3, countries with ETHNIC$_i$ below the 10th or above the 90th percentile are omitted.
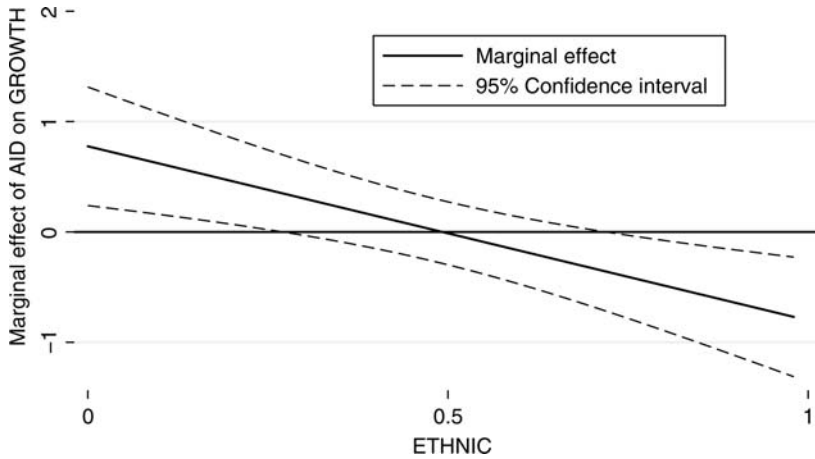
Figure 2: Aid Effectiveness and Ethnic Fractionalisation (GMM Estimates)

and the Arellano–Bond test for AR(2) fails to reject the null hypothesis of no autocorrelation.[22] In Column 1, we again find that AID_{it} has no significant effect on $GROWTH_{it}$ on average, i.e., when excluding the interaction term. Our main GMM specification in Column 2 suggests again that the effect of AID_{it} on $GROWTH_{it}$ is significant in ethnically homogenous countries, but decreases as countries become more ethnically fractionalised. Figure 2 presents the implied effect of AID_{it} on $GROWTH_{it}$ and the associated standard errors for all possible levels of $ETHNIC_i$. Like our 2SLS estimates, our GMM estimates suggest that the effect of AID_{it} on $GROWTH_{it}$ is significantly positive at low levels of $ETHNIC_i$. But unlike our 2SLS estimates, our GMM estimates further suggest that this effect is significantly negative at high levels of $ETHNIC_i$. They also imply somewhat lower threshold levels of $ETHNIC_i$. In particular, the point estimates suggest that the indirect negative effects of foreign aid may offset its direct positive effects in considerably more than half of the countries in Sub-Saharan Africa as well as in some fractionalised countries in Latin America and elsewhere.[23]

In Column 3, we again exclude the 10% least and the 10% most ethnically fractionalised countries from our samples. In Column 4, we employ

[22] The appropriate null hypothesis is absence of second-order autocorrelation because first-differencing of endogenous variables directly induces first-order autocorrelation.

[23] The point estimates in Column 2 suggest a threshold level of 0.51. $ETHNIC_i$ exceeds 0.51 in 58 of the 114 countries in our baseline sample, including 34 Sub-Saharan African and 10 Latin American countries.

all possible lags of the endogenous variables as instruments starting from the second lag. In Column 5, we collapse the set of instruments using the method proposed by Roodman (2009). In all instances, the coefficients of interest show the predicted signs and remain highly significant. In Column 6, we show that the coefficients of interest have the predicted signs and are close to being significant even when using the difference-GMM estimator. In addition, we again show in Column 7, that AID_{it} and $AID_{it} \times ETHNIC_i$ have similar effects on investment as they have on economic growth.

In the remainder of this section we present further robustness exercises based on the 2SLS regression of Column 4 of Table 2, and the system-GMM regression of Column 2 of Table 3. We have argued before that our bare-boned baseline specification is appropriate to test how ethnic fractionalisation impacts upon aid effectiveness through all possible channels. Nevertheless, we look whether our results are robust to the addition of further control variables. We start by adding a measure of trade openness ($TRADE_{it}$) to our baseline specification in all columns of Table 4, as a considerable share of aid inflows is typically used to finance imports. We then add geographical variables, namely distance from the equator ($LATITUDE_i$) and the fraction of a country's area located in the tropics ($TROPICS_i$). As a next step, we further control for institutional quality by adding the indices of political rights ($POLITICAL_{it}$) and civil liberties ($CIVIL_{it}$) from Freedom House, which are both inverse measures of institutional quality. In a further step, we include investment (INV_{it}), which is a particularly close determinant of economic growth. Finally, we add government expenditures (GOV_{it}) as a measure of fiscal policies. We find that the coefficients on AID_{it} and the interaction term still show the predicted signs and remain statistically significant at least at the 10% level, while all control variables other than investment are generally insignificant.[24]

In Table 5, we test whether our results are robust to the use of alternative measures of foreign aid. We replace AID_{it} by the two ODA-based aid measures ODA_{it}^R and ODA_{it}^X in our baseline 2SLS and GMM regressions. We note that the coefficients on these aid measures and their interactions with $ETHNIC_i$ have the predicted signs and are statistically significant in all four regressions, except that $ODA_{it}^X \times ETHNIC_i$ is marginally insignificant in Column 3.

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[24] Not surprisingly, the GMM results also continue to hold when controlling for the time-invariant geographical variables $LATITUDE_i$ and $TROPICS_i$.

Table 4: Additional Control Variables

	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) GMM	(7) GMM	(8) GMM	(9) GMM
AID_{it}	1.204	2.894	2.775	2.771	2.676	0.693	0.524	0.453	0.541
	(0.060)	(0.050)	(0.030)	(0.029)	(0.063)	(0.018)	(0.075)	(0.102)	(0.058)
$ETHNIC_i$	−0.007	0.025	0.028	0.027	0.026				
	(0.604)	(0.316)	(0.253)	(0.257)	(0.330)				
$AID_{it}*ETHNIC_i$	−1.655	−3.819	−3.657	−3.678	−3.472	−1.508	−1.293	−1.137	−1.172
	(0.076)	(0.058)	(0.033)	(0.030)	(0.062)	(0.002)	(0.006)	(0.013)	(0.009)
$TRADE_{it}$	0.002	−0.003	−0.004	−0.006	−0.004	0.007	0.011	0.006	0.005
	(0.482)	(0.652)	(0.597)	(0.377)	(0.557)	(0.196)	(0.041)	(0.196)	(0.285)
$LATITUDE_i$		0.000	0.001	0.000	0.000				
		(0.513)	(0.428)	(0.541)	(0.510)				
$TROPICS_i$		−0.003	−0.002	−0.001	−0.003				
		(0.829)	(0.924)	(0.933)	(0.853)				
$POLITICAL_{it}$			−0.002	−0.002	−0.002		−0.003	−0.002	−0.002
			(0.499)	(0.455)	(0.427)		(0.157)	(0.210)	(0.229)
$CIVIL_{it}$			0.002	0.002	0.002		0.002	0.002	0.002
			(0.603)	(0.523)	(0.504)		(0.530)	(0.389)	(0.471)
INV_{it}				0.047	0.045			0.091	0.092
				(0.112)	(0.134)			(0.001)	(0.001)
GOV_{it}					−0.039				−0.032
					(0.249)				(0.162)
GDP_{it}	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES	YES	NO	NO	NO	NO
Implied threshold $-\beta_1/\beta_3$	0.73	0.76	0.76	0.75	0.77	0.46	0.41	(0.40)	0.46

Table 4: *Continued*

	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) GMM	(7) GMM	(8) GMM	(9) GMM
Countries	763	696	591	591	591	763	656	656	656
Observations	114	93	93	93	93	114	114	114	114
R^2	0.222	0.173	0.161	0.169	0.174	—	—	—	—
Hansen J-test (p-value)	0.242	0.370	0.282	0.174	0.114	0.467	0.489	0.495	0.436
AR(2) test (p-value)	—	—	—–	—	—	0.531	0.754	0.834	0.851
GMM instrument count	—	—		—	—	57	57	58	59

Notes: Dependent variable is $GROWTH_{it}$. p-values in parentheses are based on robust and clustered standard errors in 2SLS regressions, and on robust standard errors and the Windmeijer (2005) finite-sample correction in GMM regressions. In GMM regressions, system-GMM is used with the second and third lags of the endogenous variables as instruments. In all columns, exogenous variables used as instruments are FRZ_i, CAM_i, EGY_i, POP_{it}, POP_{it}^2, $POP_{it}*ETHNIC_i$, $ARMS_{it}$, $ARMS_{it}^2$ and $ARMS_{it}*ETHNIC_i$.

Table 5: Alternative Measures of Aid

	(1) 2SLS	(2) GMM	(3) 2SLS	(4) GMM
ODA_{it}^{R}	0.771	0.450		
	(0.037)	(0.003)		
ODA_{it}^{X}			0.354	0.162
			(0.063)	(0.015)
$ETHNIC_i$	−0.006		−0.002	
	(0.659)		(0.897)	
$ODA_{it}^{R}*ETHNIC_i$	−0.938	−0.994		
	(0.068)	(0.001)		
$ODA_{it}^{X}*ETHNIC_i$			−0.444	−0.193
			(0.103)	(0.019)
GDP_{it}	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Regional dummies	YES	NO	YES	NO
Implied threshold $-\beta_1/\beta_3$	0.82	0.45	(0.80)	0.84
Countries	114	114	114	114
Observations	763	763	748	748
R^2	0.215	—	0.208	—
Hansen J-test (p-value)	0.341	0.389	0.330	0.489
AR(2) test (p-value)	—	0.924	—	0.596
GMM instrument count	—	66	—	66

Notes: Dependent variable is $GROWTH_{it}$. p-values in parentheses are based on robust and clustered standard errors in 2SLS regressions, and on robust standard errors and the Windmeijer (2005) finite-sample correction in GMM regressions. In GMM regressions, system-GMM is used with the second and third lags of the endogenous variables as instruments. In all columns, exogenous variables used as instruments are FRZ_i, CAM_i, EGY_i, POP_{it}, POP_{it}^2, $POP_{it}*ETHNIC_i$, $ARMS_{it}$, $ARMS_{it}^2$ and $ARMS_{it}*ETHNIC_i$.

In Table 6, we test whether our results are robust to the use of alternative measures of diversity and fractionalisation, as well as when addressing the potential endogeneity of ethnic fractionalisation. Our baseline specification assumes that the effect of ethnic fractionalisation on aid effectiveness is linear. We test for potential non-linearities by using a set of dummy variables indicating the quintiles of the distribution of $ETHNIC_i$. We construct the dummy variables $QUINTILEk_i$ for $k = 1, 2, 3, 4, 5$, where $QUINTILEk_i = 1$ if and only if $ETHNIC_i$ belongs to the kth quintile of $ETHNIC_i$. In Columns 1 and 2, we use these dummy variables and their interactions with AID_{it}. The 2SLS and GMM point estimates suggest that the effect of ethnic fractionalisation on aid effectiveness is indeed linear

Table 6: Alternative Measures and Instruments for Fractionalisation

	(1) 2SLS	(2) GMM	(3) 2SLS	(4) GMM	(5) 2SLS	(6) GMM	(7) 2SLS	(8) GMM
AID_{it}*QUINTILE1$_i$	1.195	0.230						
	(0.089)	(0.463)						
AID_{it}* QUINTILE2$_i$	1.136	0.212						
	(0.035)	(0.202)						
AID_{it}* QUINTILE3$_i$	0.292	0.132						
	(0.360)	(0.567)						
AID_{it}* QUINTILE4$_i$	0.149	−0.190						
	(0.830)	(0.431)						
AID_{it}* QUINTILE5$_i$	−0.134	−0.411						
	(0.576)	(0.117)						
AID_{it}			0.349	0.160	0.444	0.012	2.331	0.951
			(0.222)	(0.431)	(0.063)	(0.934)	(0.033)	(0.009)
LANGUAGE$_i$			−0.017					
			(0.133)					
AID_{it}*LANGUAGE$_i$			−0.431	−0.653				
			(0.316)	(0.057)				
RELIGION$_i$					0.016			
					(0.261)			
AID_{it}*RELIGION$_i$					−0.509	−0.067		
					(0.443)	(0.819)		
ETHNIC$_i$							0.029	
							(0.357)	
AID_{it} *ETHNIC$_i$							−3.180	−1.750
							(0.067)	(0.005)

GDP_{it}	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Regional dummies	YES	NO	YES	NO	YES	NO	YES	NO
Quintile dummies	YES	NO	NO	NO	NO	NO	NO	NO
Implied threshold $-\beta_1/\beta_3$	—	—	(0.81)	(0.25)	(0.87)	(0.18)	0.73	0.54
Countries	114	114	108	108	114	114	93	93
Observations	763	763	736	736	763	763	681	681
R^2	0.177	—	0.223	—	0.172	—	0.263	—
Hansen J-test (p-value)	0.117	0.517	0.478	0.738	0.255	0.301	0.408	0.475
AR(2) test (p-value)	—	0.940	—	0.964	—	0.937	—	0.840
GMM instrument count	—	116	—	56	—	56	—	56

Notes: Dependent variable is $GROWTH_{it}$. p-values in parentheses are based on robust and clustered standard errors in 2SLS regressions, and on robust standard errors and the Windmeijer (2005) finite-sample correction in GMM regressions. In GMM regressions, system-GMM is used with the second and third lags of the endogenous variables as instruments. In all columns, exogenous variables used as instruments include FRZ_i, CAM_i, EGY_i, POP_{it}^2 and $ARMS_{it}^2$. In addition, the interactions of POP_{it} and $ARMS_{it}$ with each of the quintile dummies are used in Columns 1–2; POP_{it}, $POP_{it}*LANGUAGE_i$, $ARMS_{it}$ and $ARMS_{it}*LANGUAGE_i$ are used in Columns 3–4; POP_{it}, $POP_{it}*RELIGION_i$, $ARMS_{it}$ and $ARMS_{it}*RELIGION_i$ are used in Columns 5–6; and $ORIGTIME_i$, $STATEHIST_i$, POP_{it}, $POP_{it}*ORIGTIME_i$, $POP_{it}*STATEHIST_i$, $ARMS_{it}$, $ARMS_{it}*ORIGTIME_i$ and $ARMS_{it}*STATEHIST_i$ are used in Columns 7–8.

or, at least, monotonic.[25] While most of the interaction terms are statistically insignificant, the difference between $AID_{it} \times QUINTILE1_i$ and $AID_{it} \times QUINTILE5_i$ is statistically significant at the 10% level in both columns. This significant difference suggests that foreign aid is indeed more effective in promoting economic growth in the ethnically least fractionalised countries than in the ethnically most fractionalised countries.

In Columns 3 to 6, we replace $ETHNIC_i$ by the indices of linguistic and religious fractionalisation ($LANGUAGE_i$ and $RELIGION_i$). The coefficients on AID_{it} and its interaction with these indices still show the predicted signs, but most of them are relatively close to zero and statistically insignificant. These results suggest that the hypothesised rent-seeking contests for aid inflows mainly occur along ethnic lines rather than religious or purely linguistic lines.[26] Caselli and Coleman (2006) provide a plausible explanation for such a pattern. They present a model in which conflicts over resources, say aid inflows, emerge if winners can easily identify losers and prevent them from infiltration when it comes to sharing the spoils of victory. They argue that not all distinctions are equally effective ways of ensuring that group members can be identified, with differences in physical appearance being more infiltration-proof than linguistic or religious differences.

While the empirical literature has so far assumed ethnic diversity to be exogenous, Ahlerup and Olsson (2011) show that ethnic fractionalisation is systematically related to the duration of human settlement since prehistoric times ($ORIGTIME_i$), and to Putterman's (2007) State Antiquity Index ($STATEHIST_i$). This index measures the extent to which a political entity above the tribal level existed in the state's present territory in the years 1 to 1950 C.E. In Columns 7 and 8, we therefore address the potential endogeneity of ethnic fractionalisation by employing $ORIGTIME_i$ and $STATEHIST_i$ and their interactions with $ARMS_{it}$ and POP_{it} as instruments for $ETHNIC_i$ and its interaction with AID_{it}. The coefficients of interest still show the predicted signs and retain their statistical significance.[27]

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[25] That is, the coefficient on $AID_{it} \times QUINTILEm_i$ is strictly higher than the coefficient on $AID_{it} \times QUINTILEn_i$ if and only if $m < n$.

[26] As mentioned in footnote 3, the theoretical models of Svensson (2000) and Hodler (2006) are in principle silent about the relevant dividing lines between rivalling groups. The insignificant results in Columns 3–6 of Table 6, however, support their emphasis on rivalling groups that are separated along ethnic lines.

[27] When adding $ORIGTIME_i$ and $STATEHIST_i$ and their interactions with AID_{it} as additional control variables in the second-stage regression (while taking $ETHNIC_i$ as exogenous), our coefficients of interest still show the expected signs, but become

In Table 7, we compare our hypothesis to other findings and hypotheses advanced in the conditional aid effectiveness literature. We thereby focus on the finding of Hansen and Tarp (2000, 2001) that there are decreasing returns to aid; the finding of Dalgaard et al. (2004) that aid is more effective outside the tropics; and the finding of Angeles and Neanidis (2009) that aid is more effective in countries with few colonial settlers and, therefore, no overly strong elite. In Columns 1 and 2, we add aid squared (AID_{it}^2) to our baseline 2SLS and GMM regressions. We note that the coefficients on AID_{it} and $AID_{it} \times ETHNIC_i$ retain the predicted signs and their statistical significance, while the coefficient on AID_{it}^2 is significant in Column 2, but not in Column 1. These results provide further support for our hypothesis. They moreover suggest that earlier studies may have found robust evidence for the hypothesis of decreasing returns to aid partly because more fractionalised countries (paradoxically) tend to receive more aid (with the correlation between AID_{it} and $ETHNIC_i$ being 0.25).

To compare our hypothesis to the finding of Dalgaard et al. (2004), we add the interaction term $AID_{it} \times TROPICS_i$ in Columns 3 and 4. Since we need to instrument also for this interaction term, we add $ARMS_{it} \times TROPICS_i$ and $POP_{it} \times TROPICS_i$ to the set of our instruments. Again, the coefficients on AID_{it} and $AID_{it} \times ETHNIC_i$ retain the predicted signs and their statistical significance at the 10% level. The interaction term $AID_{it} \times TROPICS_i$ has the expected sign and is statistically significant in column (4), but not in Column 3. While the high correlation between $TROPICS_i$ and $ETHNIC_i$, 0.53, tends to inflate the standard errors of our estimates; these results still allow us to conclude that we are not just picking up an effect of $TROPICS_i$ on aid effectiveness, but a robust and independent effect of $ETHNIC_i$ on aid effectiveness.

We finally compare our hypothesis to the findings of Angeles and Neanidis (2009). In Columns 5 and 6, we add an interaction term between AID_{it} and the share of colonial settlers ($SETTLERS_i$), i.e., the share of the population that was of European origin in colonial times, to our baseline 2SLS and GMM regressions, and we adjust the set of instruments accordingly. We find that the coefficients on AID_{it}, $AID_{it} \times ETHNIC_i$ and $AID_{it} \times SETTLERS_i$ all have the predicted signs and are statistically significant. These results provide further support for our hypothesis as well as for the hypothesis of Angeles and Neanidis. Hence, foreign

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statistically insignificant. This, however, is hardly surprising as the high correlation between $ETHNIC_i$ and $ORIGTIME_i$, which is 0.55, tends to inflate the standard errors.

Table 7: Alternative Determinants of Aid Effectiveness

	(1) 2SLS	(2) GMM	(3) 2SLS	(4) GMM	(5) 2SLS	(6) GMM
AID_{it}	2.007	1.156	3.054	1.238	3.298	1.652
	(0.041)	(0.005)	(0.030)	(0.000)	(0.044)	(0.006)
$ETHNIC_i$	−0.005		0.032		0.012	
	(0.724)		(0.292)		(0.633)	
$AID_{it}*ETHNIC_i$	−1.662	−1.274	−4.888	−1.098	−4.319	−2.589
	(0.080)	(0.008)	(0.069)	(0.057)	(0.050)	(0.002)
AID_{it}^2	−6.659	−4.071				
	(0.355)	(0.085)				
$TROPICS_i$			−0.018			
			(0.080)			
$AID_{it}*TROPICS_i$			0.903	−0.865		
			(0.402)	(0.000)		
$SETTLERS_i$					0.001	
					(0.034)	
$AID_{it}*SETTLERS_i$					−7.831	−3.639
					(0.028)	(0.063)
GDP_{it}	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES
Regional dummies	YES	NO	YES	NO	YES	NO
Countries	114	114	95	95	95	95
Observations	763	763	710	710	699	699
R^2	0.250	—	0.090	—	0.225	—
Hansen *J*-test (*p*-value)	0.297	0.338	0.320	0.433	0.100	0.551
AR(2) test (*p*-value)	—	0.672	—	0.788	—	0.998
GMM instrument count	—	74	—	76	—	76

Notes: Dependent variable is $GROWTH_{it}$. *p*-values in parentheses are based on robust and clustered standard errors in 2SLS regressions, and on robust standard errors and the Windmeijer (2005) finite-sample correction in GMM regressions. In GMM regressions, system-GMM is used with the second and third lags of the endogenous variables as instruments. In all columns, exogenous variables used as instruments include FRZ_i, CAM_i, EGY_i, POP_{it}, POP_{it}^2, $POP_{it}*ETHNIC_i$, $ARMS_{it}$, $ARMS_{it}^2$ and $ARMS_{it}*ETHNIC_i$. In addition, $POP_{it}*TROPICS_i$ and $ARMS_{it}*TROPICS_i$ are used in Columns 3–4; and $POP_{it}*SETTLERS_i$ and $ARMS_{it}*SETTLERS_i$ are used in Columns 5–6.

aid becomes less effective when there are many rivalling groups as well as when there exists a strong elite of colonial settlers. These results are consistent with the idea that rent-seeking contests caused by aid inflows get more detrimental when the number of ethnic groups rises, as well as when the

differences in physical appearance across the major ethnic groups grow larger.

4. Conclusions

Using panel data covering 114 aid-recipient countries over the period 1962 to 2001, we find that foreign aid is effective in promoting economic growth in ethnically homogenous countries and that higher ethnic fractionalisation reduces aid effectiveness. Our estimates suggest that foreign aid may be ineffective or even harmful in many fractionalized countries, most of which are located in Sub-Saharan Africa. These findings are consistent with the hypothesis that there is a direct positive effect of foreign aid on economic growth, which is offset in fractionalised countries in which aid inflows may provoke detrimental rent-seeking contests.

Our findings have important implications for future foreign aid policy. They suggest that more focus should be placed on the degree of integration of distinct groups in a country. If a country is starkly fractionalised, fungible aid flows without conditions and close oversight may do more harm than good. A clearer view on practical methods that are effective in counteracting the negative side effects of aid in fractionalised countries would certainly benefit from further research on a more microeconomic level.

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Appendix A: Data description

AID_{it}: Constant price effective development assistance relative to constant price PPP-adjusted GDP, averaged over the years t to $t + 3$. *Source:* Roodman (2004)

$ARMS_{it}$: Arms imports in US$ divided by current-price PPP-adjusted GDP, averaged over the years t to $t + 3$. *Source:* SIPRI Arms Transfers Database and Penn World Tables

CAM_i: Dummy variable equal to 1 for Central American countries. *Source:* Roodman (2004)

$CIVIL_{it}$: Index of civil liberties, ranging from 1 to 7, with higher values indicating less liberties, averaged over the years t to $t + 3$. *Source:* Freedom House

$EGYPT_i$: Dummy variable equal to 1 for Egypt. *Source:* Roodman (2004)

$ETHNIC_i$: Index of ethnic fractionalization. *Source:* Alesina *et al.* (2003)

FRZ_i: Dummy variable equal to 1 for member countries of the Franc Zone. *Source:* Roodman (2004)

GDP_{it}: Constant price PPP-adjusted per capita GDP in year t. *Source:* Roodman (2004)

GOV_{it}: Constant price PPP-adjusted government expenditures as a share of GDP, averaged over the years t to $t + 3$. *Source:* Penn World Table 6.3

$GROWTH_{it}$: Growth rate of constant price PPP-adjusted per capita GDP, averaged over the years t to $t + 3$. *Source:* Roodman (2004)

INV_{it}: Constant price PPP-adjusted investment as a share of GDP, averaged over the years t to $t + 3$. *Source:* Penn World Table 6.3

$LANGUAGE_i$: Index of linguistic fractionalization. *Source:* Alesina *et al.* (2003)

LATITUDE$_i$: Absolute latitude. *Source:* Gallup *et al.* (1999)

ODA$_{it}^R$: Constant price net overseas development assistance relative to constant price PPP-adjusted GDP, averaged over the years t to $t+3$. *Source:* Roodman (2004)

ODA$_{it}^X$: Constant price net overseas development assistance relative to constant price GDP converted to US\$ on an exchange rate basis, averaged over the years t to $t+3$. *Source:* Roodman (2004)

ORIGTIME$_i$: Duration of human settlement. *Source:* Ahlerup and Olsson (2011)

POLITICAL$_{it}$: Index of political rights, ranging from 1 to 7, with higher values indicating less rights, averaged over the years t to $t+3$. *Source:* Freedom House

POP$_{it}$: Natural logarithm of population, averaged over the years t to $t+3$. *Source:* Roodman (2004)

RELIGION$_i$: Index of religious fractionalization. *Source:* Alesina *et al.* (2003)

SETTLERS$_i$: Share of population of European origin in colonial times. *Source:* Angeles and Neanidis (2009)

STATEHIST$_i$: State Antiquity Index, which measures the extent to which a political entity above the tribal level existed in the state's present territory in the years 1 to 1950. *Source:* Putterman (2007)

TRADE$_{it}$: Total trade relative to GDP in constant price PPP-adjusted terms, averaged over the years t to $t+3$. *Source:* Penn World Tables 6.3

TROPICS$_i$: Fraction of a country's area located in the tropics. *Source:* Gallup *et al.* (1999)