European University Institute

MAX WEBER PROGRAMME FOR POSTDOCTORAL STUDIES

EUI WORKING PAPERS

MWP 2017/05
Max Weber Programme

The impact of foreign aid on migration revisited

Mauro Lanati and Rainer Thiele

European University Institute
Max Weber Programme

The impact of foreign aid on migration revisited

Mauro Lanati and Rainer Thiele

EUI Working Paper **MWP** 2017/05

ISSN 1830-7728

Printed in Italy
European University Institute
Badia Fiesolana
I – 50014 San Domenico di Fiesole (FI)
Italy
www.eui.eu
cadmus.eui.eu

Abstract

While policymakers hope to stem migration flows by giving foreign aid, existing empirical evidence points in the opposite direction: by loosening budget constraints, aid tends to encourage people to emigrate. In this paper, we revisit the aid-migration link using a substantially extended and adjusted econometric approach based on a gravity model of international migration. In contrast to the previous literature, we obtain evidence of a negative relationship between aid and emigration rates. This even holds for the poorer part of recipient countries, which suggests that the budgetary constraint channel does not play a significant role in shaping migration decisions. The most plausible explanation for these contrasting results is that, unlike in previous studies, we use migrant flows rather than migrant stocks as the dependent variable.

Keywords

Aid, migration.

JEL codes: F22, F35, O15

Mauro Lanati
Migration Policy Centre (EUI) and Max Weber Fellow at the Robert Schuman Centre of Advanced Studies (EUI), 2016-2017

Rainer Thiele
Kiel Institute for the World Economy

1. Introduction

The question of how to deal with rising South-North migration is currently high on the international policy agenda, particularly in Europe. With the refugee crisis and the arrival of thousands of migrants on the Southern European coasts, there's a growing pressure on the European Commission and the most affected EU member states to find a quick way to effectively manage (and arrest) the migration flows, and many see foreign aid as an essential part of the solution. Indeed, pledges to scale up aid to developing countries are now routinely accompanied by statements arguing that helping countries to develop gives their people an incentive to stay at home. In June 2015, for instance, the UK Defence Secretary declared that "Britain needs to spend more of its budget on helping stabilise countries so that it doesn't have to 'fish' migrants out of Mediterranean" (*The Guardian*, 21st June 2015). But does foreign aid really help reduce migration flows?

Theoretically, the impact of foreign aid on migration is subject to contrasting forces and its net effect is not clear cut *a priori* (Parsons and Winters 2014; Berthélemy et al. 2009). In general, there is no direct link between aid and migration.[1] Aid is expected to affect the determinants of migration, most notably incomes in developing countries; the hypothesis is that aid raises disposable incomes and that higher incomes in turn reduce emigration (*Income Channel*).[2] Aid might also influence other determinants of migration, in particular the impact that additional wealth could have on financing migration costs for a larger share of the population in the countries of origin (*Budgetary Constraint Channel*). This transmission mechanism would point in the opposite direction of aid-induced rises in migrant outflows, indicating that loosening budget constraints makes migration more feasible. Combining the two channels gives rise to the hypothesis of a hump-shaped pattern of migration (see, for example, Clemens 2014), which implies that at very low levels of income per capita, growth spurs migration by allowing poor migrants to better afford the migration-related costs (the Budgetary Constraint Channel dominates), whereas at higher levels of income per capita the Income Channel becomes more and more important relative to the Budgetary Constraint Channel.

The link between aid flows and migration is still fairly unexplored empirically. Yet, there appears to be some consensus in the literature that the effect of foreign aid on migration flows is positive, suggesting that the Budgetary Constraint Channel dominates the Income Channel. Faini and Venturini (1993) postulate that income growth may fail to halt emigration because it relaxes credit

[1] The migration compacts currently being discussed at the EU-level (see EC 2016) would constitute an exception.
[2] Note that for the income channel to work, aid needs only to raise disposable household incomes, but not economy-wide growth rates. Hence, the highly contentious debate on the aid-growth relationship (see, for example, Rajan and Subramanian 2008) is not touched upon here.

constraints, which tend to be especially binding in poorer contexts. They estimate some simple regressions using migration data for Greece, Portugal, Spain, and Turkey and find support for their hypothesis. A more recent and influential cross-country study that investigates the aid-migration link is Berthélemy et al. (2009). In addition to the budgetary and income effect, they also identify a *Network Channel* through which bilateral aid may be associated with migration flows: more bilateral contacts through the implementation of aid projects increases the information on the donor country available among potential migrants in the recipient country, which implies lower transaction costs for the migrants. Their cross-section estimates indicate that both bilateral aid and recipient's total aid have significantly positive impacts on migrant stocks.

In this paper, we argue that the issue of how foreign aid affects migration decisions is not yet resolved and provide new empirical evidence on the aid-migration link. Our analysis departs from Berthélemy et al. (2009), but we substantially extend and adjust their approach in a number of ways. First, we employ migrant flows rather than stocks as the dependent variable. Using stocks may be misleading as migrants born in country of origin i may have resided in destination country n long before foreign aid was given to that destination country. In addition, differences in stocks –– a measure often utilized in the literature as a proxy for gross migration flows (see for instance Beine and Parsons, 2015) – are affected by return migration and can take negative values. Hence, the stock variable cannot effectively capture the effect of foreign aid on the migration decision. Migrant stocks are included as an additional regressor to proxy for migrant networks that reduce the cost of moving to destination country n. Second, we pool time-series and cross-section data instead of using a pure cross section, which attenuates econometric problems concerning the identification of causal effects. Most importantly, through the appropriate specification of destination and origin fixed effects, we can account for so-called multilateral resistance to migration, i.e. for the fact that the choice of a potential migrant to move to a given destination country does not only depend on the attractiveness of the country of destination relative to the country of origin, "but also on how this relates to the opportunities to move to other destinations" (Bertoli and Fernandez-Huertas Moraga 2013), p.79). Failing to capture multilateral resistance to migration may create large distortions in the estimated coefficients (ibid). Third, we derive our econometric specification from a gravity model of international migration. Since we conjecture that foreign aid may have an impact on the budget constraint at the household level, the model provides a microfoundation of the link between income generated through aid inflows and migration choices. Fourth, we run separate regressions for poorer and richer recipient countries, which enables us to test whether the budgetary constraint channel is indeed relevant at low levels of per capita income. Finally, we control for time-varying, origin-specific covariates of migration decisions, such as environmental factors and the presence of conflicts. We interact the conflict variable with foreign aid in order to examine whether donors are able to check migrant flows in conflict situations.

In contrast to the previous literature, we obtain evidence of a negative relationship between ODA and emigration rates. This even holds for the poorer half of recipient countries, which suggests that the budgetary constraint channel does not play a significant role in shaping migration decisions. We also find that foreign aid has an even stronger negative impact on the emigration rate in the presence of conflicts.

The remainder of the paper is structured as follows. In Section 2, we derive the econometric specification employed in the empirical analysis and discuss how we addressed the challenge of identifying causal effects. Section 3 introduces the data and provides some descriptive evidence on the link between foreign aid and migration, while Section 4 presents the regression results. Section 5 concludes.

2. Model and Econometric Specification

Our econometric analysis of the relationship between foreign aid and migration builds upon the model of international migration introduced by Beine and Parsons (2015), to which we add the bilateral aid given by country n to country I, as well as the overall aid received by country I, as factors affecting migration decisions. The model depicts homogeneous agents whose decision on whether and where to migrate is based on a comparison of the utility associated with each possible destination. Individuals maximize their utility across a pool of destinations, including the home country. At each period of time t, the native population in country n, denoted by $N_{n,t}$, chooses its optimal location among a set of i alternative destinations including home country n. The number of individuals born in country n who choose i as optimal destination is denoted by $N_{ni,t}$. The utility of an individual born in country n and staying in that country at time t is log-linear in income and function of the characteristics of the country of origin as well as the costs associated with migration. It is given by

$$(1)\ \ u_{nn,t} = ln(w_{n,t}) + A_{n,t} + \varepsilon_{n,t}$$

where $w_{n,t}$ refers to the wage in country n at time t, $A_{n,t}$ denotes the characteristics of country n – including, for instance, expenditures on public goods, employment opportunities, and amenities, as well as the amount of foreign aid received – and $\varepsilon_{n,t}$ is an independent and identically distributed (i.i.d.) extreme-value distributed error term. The utility associated with migration from the origin country n (recipient) to the destination country i (donor) at time t is given by

$$(2)\ \ u_{in,t} = ln(w_{i,t}) + A_{i,t} - C_{in,t}(.) + \varepsilon_{i,t}$$

where $C_{ni,t}(.)$ stands for the costs associated with migration. As the error term has an i.i.d. extreme-value distribution by construction, following McFadden (1974) we can express the probability that an individual born in country n will move to country i as

$$(3)\ \ Pr\left[u_{in,t} = \max_{k} u_{nk,t}\right] = \frac{N_{in,t}}{N_{n,t}} = \frac{exp[ln(w_{i,t}) + A_{i,t} - C_{in,t}(.)]}{\sum_k exp[ln(w_{k,t}) + A_{k,t} - C_{nk,t}(.)]}$$

If we take the ratio between number of people who emigrate ($N_{in,t}$) and the corresponding expression for the number of stayers ($N_{nn,t}$), the bilateral migration rate between n and i ($N_{in,t}/N_{nn,t}$) can therefore be written as

$$(4)\ \ \frac{N_{in,t}}{N_{nn,t}} = \frac{exp[ln(w_{i,t}) + A_{i,t} - C_{in,t}(.)]}{exp[ln(w_{n,t}) + A_{n,t}]}$$

Taking logs, the equation reduces to:

$$(5)\ \ ln\left(\frac{N_{in,t}}{N_{nn,t}}\right) = ln\left(\frac{w_{i,t}}{w_{n,t}}\right) + A_{i,t} - A_{n,t} - C_{in,t}(.)$$

Equation (5) identifies the main determinants of the aggregate bilateral migration rate: the wage differential as given by the ratio $w_{i,t}/w_{n,t}$, the characteristics at destination $A_{i,t}$, the characteristics at origin $A_{n,t}$, and the migration costs of moving from n to i, $C_{ni,t}$.

The migration cost function incorporates time-invariant as well as time-varying factors. Following Beine and Parsons (2015), we assume separability in all these determinants. Among the time-varying components of $C_{ni,t}$, we distinguish two kinds of network variable: the size of migrant networks, a standard determinant of migration cost which we capture by the pre-determined stock of migrants from country n living in country i (denoted by $\mathrm{MigStock}_{in,t-1}$), and bilateral aid ($\mathrm{BilAid}_{ni,t-1}$), which increases contacts between residents of the two countries and thereby lowers transaction costs for prospective migrants. The time-invariant factors include standard gravity-type dyadic determinants such as physical distance (dist_{ni}), linguistic distance ($\mathrm{LangDist}_{ni}$), and past colonial relationships (Colony_{ni}), together with monadic components that are specific to the origin country but constant over time (x_n), such as the geographic location. We also add factors that are destination-specific, either constant over time x_i, time-specific x_t (such as the general decrease in transportation costs), or time-varying $x_{i,t}$. The cost function can then be expressed as

$$(6)\quad C_{in,t} = c\left(\mathrm{MigStock_{in,t-1}}, \mathrm{BilAid_{ni,t-1}} \mathrm{dist_{ni}}, \mathrm{Colony_{ni}}, \mathrm{LangDist_{ni}},, x_i, x_t, x_{i,t}, x_n\right)$$

Time-varying characteristics at origin $A_{n,t}$ comprise: the aggregate level of foreign aid the country receives ($\mathrm{AggAid_{n,t-1}}$), which is supposed to positively affect the welfare of the local population; the presence (or absence) of conflict $\left(\mathrm{Conflict_{n,t-1}}\right)$; a variable that controls for the quality of governance ($\mathrm{Governance_{n,t-1}}$); adverse environmental factors as measured by the number of natural disasters in a given year ($\mathrm{NatDis_{n,t-1}}$);[3] and demographic push factors at origin, which we capture by the total dependency ratio, i.e. the total population aged less than 15 or over 64 as a share of the working age population ($\mathrm{Dependency_{n,t-1}}$).

The function for the time-varying characteristics at origin can thus be expressed as

$$(7)\quad A_{n,t} = A\left(\mathrm{AggAid_{n,t-1,}} \mathrm{Conflict_{n,t-1}}, \mathrm{Governance_{n,t-1}}, \mathrm{NatDis_{n,t-1}}, \mathrm{Dependency_{n,t-1}}\right)$$

For simplicity, we are not showing the expression for the time-varying determinants of migration costs $A_{i,t}$ along the lines of Equation (7) as the impact of those factors will be entirely absorbed by the inclusion of destination-time fixed effects in the econometric analysis.

Inserting the expressions for $A_{n,t}$ and $C_{ni,t}$ into Equation (5) leads to the following econometric specification, on which the regression results presented below are based:

$$(8)\quad ln\left(\frac{N_{in,t}}{N_{nn,t}}\right) = \beta_1 ln\left(\frac{w_{i,t}}{w_{n,t}}\right) + a_{i,t} + a_n + \beta_2 \ln(\mathrm{AggAid_{n,t-1}}) + \beta_3(\mathrm{Conflict_{n,t-1}}) + \beta_4(\mathrm{Governance_{n,t-1}}) + \beta_5(\mathrm{Dependency_{n,t-1}}) + \beta_6(\mathrm{NatDis_{n,t-1}}) + \beta_7 \ln(1 + \mathrm{MigStock_{in,t-1}}) + \beta_8 ln(\mathrm{dist_{ni}}) + \beta_9(\mathrm{Colony_{ni}}) + \beta_{10}(\mathrm{LangDist_{ni}}) + \beta_{11}\ln(\mathrm{BilAid_{ni,t-1}}) + \varepsilon_{ni,t}$$

Since our main focus is on estimating the impact of aggregate aid – a variable that is time-variant at origin –, on migration decisions, we use an appropriate set of fixed effects $a_{i,t}$ and a_n to absorb the impact of destination-specific and time-invariant origin determinants of migration, respectively.

The inclusion of these fixed effects leads to important advantages in the empirical specification. First, it significantly lowers the risk of misspecification and therefore renders it easier to correctly

[3] Natural disasters include droughts, earthquakes, extreme temperatures, floods, storms, volcanic eruptions, epidemics, insect infestations, and miscellaneous occurrences (i.e., technological accidents of a non-industrial or transport nature).

identify the impact of foreign aid. In particular, the inclusion of $a_{i,t}$ absorbs the impact of migration policies, which are likely to be highly significant drivers of migration decisions but for which data are often not readily available.[4] Second, and most importantly, this specification also allows us to account for multilateral resistance to migration. Building on the intuition of Anderson and Van Wincoop (2003, 2004), Bertoli and Fernandez-Huertas Moraga (2013) stressed the importance of accounting for multilateral resistance to migration in the gravity framework because failing to do so would lead to significant biases in the estimated coefficients of the determinants of migration The standard approach to control for multilateral resistance to migration in our model is through the inclusion of fixed origin-time and destination-time effects. It is important to note that our inclusion of destination time-varying fixed effects will completely account for any multilateral resistance in receiving countries (see Feenstra, 2004), which – as Beine and Parsons (2015) pointed out – is presumably the most important aspect in the context of international migration, given the prominent role that migration policies of the destination country play. Moreover, we found that using origin and time fixed effects yield similar results for the dyadic factors to the inclusion of origin-time fixed effects, a result that is in line with Parsons (2012).[5] This makes us confident that our model effectively captures multilateral resistance to migration in origin countries.

Beside the fixed effects, which attenuate potential estimation biases, we include a fairly limited number of controls. In addition to aggregate aid, our main variable of interest, we choose a selected group of key indicators, which we consider the main drivers of international migration. Importantly, as shown below, almost all these factors have a robust impact on bilateral migration with expected signs in line with the previous literature.[6]

Endogeneity concerns

An important econometric issue in our specification is the potential endogeneity of the stock of migrants and the bilateral aid flows. The first source of endogeneity of bilateral aid and the network variables in migration models is associated with the potential omission of unobserved factors that might be correlated both with the error term (and thus migration rates) and with these bilateral covariates. Beine *et al.* (2011) implement a set of instruments including guest-worker programs and

[4] Ortega and Peri (2013) found a significant impact of migration policies at destination. However, they focus on tightness of entry laws, which captures only part of the migration decision determinants on the policy side. Indeed, as Ortega and Peri (2013) themselves pointed out, "besides entry laws, other laws may be relevant to migration decisions: integration and citizenship, access to public services and so on".

[5] The results for the comparison between the gravity model with origin-time fixed effects on the one hand and separate time and origin fixed effects on the other are available upon request. It has to be noted that the findings of Parsons (2012) are obtained in the context of international trade, but we believe the same arguments on the impact of multilateral resistance apply here.

[6]See Beine et al. (2015) for a thorough review of the determinants of international migration using a gravity framework.

a variable capturing the unobserved diaspora in the 1960s. Reassuringly, they find that the estimated coefficient of their diaspora variable is largely unaffected by the use of instrumental variables. However, their empirical analysis is for a cross-section without an ni, t dimension, and hence their instruments are not applicable here. In the absence of valid instruments, Beine and Parsons (2015) address the issue of endogeneity of the network variable by augmenting the model with additional covariates, which potentially capture part of the effect of these time-varying factors, and find that the impact of the diaspora is robust to such an extension. Along the same lines, as a robustness check, we add bilateral trade flows – both imports and exports – that can reasonably be related to both migrant stocks and bilateral ODA, as well as the error term. Trade-migration links have been shown to exist in a large number of empirical studies (for a survey, see Parsons and Winters, 2014). Likewise, both the aid allocation literature that identifies trade interests as one important donor motive (e.g. Hoeffler and Outram, 2011), and the literature on the impact of aid for trade (e.g. Hühne et al., 2014; Calì and Te Velde, 2011) suggest a correlation between international trade and foreign aid.

The other source of potential endogeneity is reverse causality. Reverse causality is unlikely to be a concern for the network variable, given that our proxy for migrant networks is predetermined with respect to migration flows. For bilateral ODA, however, it cannot be ruled out. More specifically, even in a specification with predetermined ODA flows from time $(t - 1)$, actual migration flows at time t can be considered the expected flows at time $(t - 1)$, and expected flows may play an important role in the amount of bilateral aid given to any particular country of origin. For instance, the EU's practical stance on co-development has largely revolved around the interests of destination countries (Gubert, 2014), targeting development aid to those recipients willing to implement migration control measures and accept repatriation. In an empirical study on a large sample of country pairs, comprised of 22 donors and more than 150 recipients over the period 1993-2008, Bermeo and Leblang (2015) find that donors do indeed use foreign aid to achieve their broader immigration goals, targeting migrant sending areas to increase development and decrease the demand for entry into the donor country.

To address the potential endogeneity due to the joint determination of aid and migration, we follow Berthélemy et al. (2009) and employ a three-stage least squares (3SLS) approach to estimate the effect of foreign aid on migration flows for a system of equations. While the migration equation is defined as above, the bilateral aid equation in the 3SLS estimation is given by

$$(9)\ \ln(\text{BilAid}_{\text{ni,t}-1}) = \alpha_1 ln\left(\frac{N_{in,t}}{N_{nn,t}}\right) + \alpha_2\ln\left(\text{BilTrade}_{\text{ni,t}-1}\right) + \alpha_3\ln\left(\text{BilTrade}_{\text{in,t}-1}\right) + \alpha_4\text{Colony}_{\text{ni}} + \alpha_5\ln\left(\text{AggAid}_{\text{n,t}-1}\right) + \alpha_6\text{Governance}_{\text{n,t}-1} + \alpha_7\ln\left(\text{GDPpc}_{\text{n,t}-1}\right) + \alpha_8\ln\left(\text{Pop}_{\text{n,t}-1}\right) + \alpha_9\text{Conflict}_{\text{n,t}-1} + \alpha_{10}\text{NatDis}_{\text{n,t}-1} + a_{i,t-1} + a_n + \text{u}_{\text{in,t}-1}$$

Equation (9) contains the main elements of the conventional aid allocation framework (e.g. Hoeffler and Outram, 2011), including: GDP per capita ($\text{GDPpc}_{\text{n,t}-1}$) and natural disasters ($\text{NatDis}_{\text{n,t}-1}$) as indicators of recipient need; the quality of governance as an indicator of recipient merit; and exports $\left(\text{BilTrade}_{\text{in,t}-1}\right)$ as an indicator of donor self-interest. It deviates in several respects from the one estimated by Berthélemy et al. (2009). First, contrary to the cross-section estimated in Berthélemy et al. (2009), the aid equation proposed here contains the same set of fixed effects as the migration equation. This allows us to address (at least partially) any omitted variable bias because $a_{i,t}$ and a_n capture all time-varying, donor-specific factors as well as the time-invariant recipient-specific determinants that may affect aid flows. Second, bilateral aid is a function of the "expected" bilateral migration flows. Third, to capture trade intensity, instead of trade openness we include the actual bilateral trade flows – imports and exports – between donor and recipient.

3. Data and Descriptive Analysis

Data

The sample used in the subsequent empirical analysis includes 28 donor countries (migrant destination) and 136 recipient countries (migrant origin). The period under consideration is 1995 to 2014. Data on migration – both the bilateral stocks of immigrants born in country n and resident in country i as well as the annual bilateral migration flows – are from the OECD international migration database. The missing observations in the migration dataset are automatically dropped. The number of zeros in the dependent variable amounts to around five percent of the total number of observations. Hence, taking logs of emigration rates in the dependent variable is unlikely to cause a considerable loss of information that could create severely biased results due to a possible selection bias. In addition, the Poisson PML approach proposed by Santos Silva and Tenreyro (2006) to deal with the problem of zero observations only fully accounts for multilateral resistance to migration and therefore is consistent only if origin-time fixed effects are included (Beine et al., 2015). Hence, it cannot be applied in our context as the fixed effects would capture the impact of our main variable of interest, $\text{AggAid}_{\text{n,t}-1}$, which varies over time at origin.

For our main explanatory variable of interest, foreign aid, data are gross disbursements expressed in constant US dollars from the Development Assistance Committee (DAC)-OECD dataset. In a robustness check we alternatively employ net disbursements, which may come closer than gross disbursements to capturing the resources that actually reach the population of the recipient country. We take averages for the bilateral as well as the total aid received to account for the volatility of annual aid flows. Specifically, bilateral and total aid received at time t-1 is the 3-year average between t-1 and t-3. The wage ratio between destination and origin, another variable of major interest, is proxied by the correspondent ratio of GDP per capita in constant US dollars.

Most of the remaining control variables are specified along conventional lines. The only major exception is linguistic distance, for which we use a more refined measure of language proximity introduced by Adsera and Pytlikova (2015), instead of the standard dummy for common official language usually employed in the literature.[7] This index ranges from 0 to 1, depending on "how many levels of the linguistic family tree the languages of both the destination and the source country share". As for the quality of governance in countries of origin, we include the World Bank's index of Political Stability and Absence of Violence, which emphasizes the security aspect of governance, in the baseline specification. We acknowledge, however, that many other aspects of governance may also affect migration decisions and thus we perform a robustness check using Voice and Accountability and Regulatory Quality as alternative governance indicators relating to democracy and state effectiveness, respectively. A complete list of variables, including brief descriptions and sources, is given in Table A1.

Descriptive Analysis

A stylized fact of the migration literature is that, at relatively low levels of GDP per capita, an income increase will be associated with a rise in migration, whereas the reverse is true at relatively high levels of GDP per capita, giving rise to a hump-shaped distribution (e.g. Adams and Page 2003; Clemens, 2014; Hatton and Williamson, 2002). We also observe such a hump-shaped relationship between GDP per capita and the share of total flows of emigrants in the countries of origin quite clearly in our data (see Figure 1).

According to previous empirical studies (Berthélemy et al. ,2009; Faini and Venturini, 1993), this hump-shaped pattern carries over to the link between foreign aid and migration. In our dataset, total ODA and the emigration rate appear to be negatively correlated (see Figure 2). In addition, the

[7] To depict former colonial relationships and the presence of conflicts at origin in a particular year we utilize standard dummy variables.

slope seems to be constant for any level of ODA, as the quadratic trend has a shape that is very similar to the linear one. More importantly, the same pattern prevails at different levels of income. Figure 3 plots the relationship between aid and the emigration rate and for the first (0^{th} – 33^{rd}) and the third (66^{th} – 100^{th}) tercile of the GDP per capita distribution: the slope is clearly negative for poorer as well as for relatively richer countries. What emerges from this simple correlation is that the additional aid received seems to provide an incentive to stay rather than leave. In other words, the budgetary constraint hypothesis, according to which any poverty reduction that would be induced by foreign aid may help to alleviate the budgetary constraint faced by the poor and may then translate into more migration, does not seem to apply here. In the next section, we investigate whether this finding continues to hold in a multivariate regression framework.

4. Regression Results

In presenting the regression results, we start with a base specification along the lines of equation (8) and then add a number of robustness checks.

Baseline regressions

Table 1 reports the baseline estimates using a Pooled OLS approach. The first three columns show results based on the full sample. Following Ortega and Peri (2013), we progressively add fixed effects to the specification, starting with destination-year fixed effects (column 2) and then also including origin fixed effects (column 3). Comparing columns 1-3 reveals large differences between specifications for several covariates – the coefficient of $\mathrm{Conflict}_{n,t-1}$, for example, turns from significantly negative to significantly positive, whereas the opposite is true for $\mathrm{PolStability}_{n,t-1}$ –, which indicates how important it is to properly account for multilateral resistance to migration.

Column 3 reports for the full sample the results of our preferred specification, including all fixed effects, while the last two columns show the corresponding regression coefficients obtained from separate estimations of countries below and above the median of GDP *per capita*. In column 3, all the dyadic determinants of migration, with the exception of the GDP ratio, have the expected sign and are statistically significant. A larger diaspora, linguistic affinity, and a colonial relationship all spur migration flows. Conversely, the larger the distance between origin and destination (i.e., the greater the migration costs), the lower, on average, are the associated migration flows. As columns 4 and 5 reveal, these relationships hold, irrespective of whether richer or poorer countries of origin are considered. The GDP ratio coefficient is insignificant for the full sample, but in accordance with Figure 1 above shows the familiar hump-shape if we split the sample into poorer and richer countries: its impact on emigration rates is significantly negative at lower levels of GDP per capita and turns significantly positive at relatively higher levels of GDP per capita.

Our estimates reveal that the attraction effect of bilateral foreign aid is positive and significant; this finding is consistent across different levels of income. However, the impact is much smaller than the one reported by Berthélemy et al. (2009). We attribute the weaker effect in our analysis to the inclusion of the migrant stock variable among the covariates. Indeed, the size of migrant networks is likely to have a much larger influence on the information channel of the migration decision as compared to bilateral aid flows. The magnitude of the diaspora effect we estimate is in line with the previous literature on the determinants of international migration (see for instance Beine and Parsons, 2015; Beine et al., 2015).

Turning to the monadic determinants of migration, our main variable of interest – the aggregate ODA received – is negatively associated with migration flows. More importantly, and in line with the descriptive evidence, the split samples reveal that larger inflows of ODA have a negative impact on bilateral emigration flows at any level of income. This corroborates that the budgetary constraint hypothesis for the impact of ODA on migration in poor contexts does not appear to be an adequate interpretation of the empirical evidence. Furthermore, this finding has important implications in terms of *external spillovers*, as an increase of foreign aid from sources other than country *i* (multilateral ODA or bilateral ODA from sources $k \neq i$) reduces the flows of migrants towards country *i*. Interestingly, the evidence suggests that an individual donor country has a negligible compound effect on migration to itself, as the sum of bilateral and total ODA coefficients is very close to zero. In other words, our results indicate that the positive effect associated to the *network channel* of foreign aid is (almost) completely offset by the *income channel*.As expected, conflict is an important driver of emigration. However, this applies especially in poor contexts; for those countries that are located above the median the conflict dummy is no longer significant. All regressions include the aid-conflict interaction, which indicates that foreign aid has an even stronger negative impact on emigration rates in the presence of conflicts. Again, this is particularly evident in countries with below-median incomes. The *dependency ratio* has the expected negative effect on migration flows,[8] while the incentive to emigrate rises with the level of political instability in the

[8] A high total dependency ratio indicates a scarcity of workers to support both the young and the elderly, either directly or through the tax system. Conversely, a low dependency ratio implies that a large number of working age people exist at origin, which increases the likelihood of emigration.

country of origin.[9] Both effects are significant for the full sample but turn insignificant at conventional levels when running separate regressions for richer and poorer countries. Finally, the number of natural disasters in the origin country is not a significant determinant of international migration, which corroborates the previous finding by Beine and Parsons (2015), whose analysis placed particular focus on the potential role of environmental factors in shaping migration decisions.

Robustness checks

In our first robustness check, we replicate our analysis using 3SLS in order to address the issue of joint determination of bilateral aid and migration. The estimates of the migration equation are presented in Table 2. Reassuringly, the results essentially confirm the findings of the Pooled OLS model, with no changes in the sign and statistical significance of coefficients, the only exception being dependency in column 3. The size of coefficients is also generally in the same order of magnitude in both specifications. Table A2 shows the results for the corresponding aid equation. The expected migration flows have a positive impact on the bilateral ODA flows, which suggests that efforts, for example by the EU, to target development aid to recipients willing to implement migration control measures and accept repatriations is not the dominant driver of bilateral aid allocations. The remaining covariates point to the mix of selfish and altruistic donor motives typically found in the aid allocation literature (e.g. Hoeffler and Outram, 2011; Acht et al., 2015). On the one hand, the political and economic interests of donors play a significant role: former colonies receive more foreign aid, and bilateral trade relationships positively affect aid inflows, with exports from donor to recipients having a much larger impact. On the other hand, donors take recipient need into account, giving more aid to poorer recipients. As for the institutional variables, there is no clear pattern: donors seem to favor democracies (*Voice and Accountability*), but not to pay attention to the quality of the recipients' government (*Political stability* and *Regulatory Quality*). This ambiguity is also in line with the previous literature (e.g. Clist, 2011).

Table 3 compares our baseline results of Table 1 with the estimates based on the same specification that includes additionally only bilateral trade relationships, both imports and exports. The purpose is to test for omitted variable bias: imports and exports might be correlated with both the intensity of

[9] Note that the expected theoretical sign of political stability at origin is ambiguous. This is because, while repressive political regimes might increase residents' desire to leave, they typically also increase the costs of migration. It might be extremely difficult for residents living in a dictatorship to obtain authorization to leave the country, for example. Foreign diplomatic representation also tends to be less important in such countries, which, in turn, significantly raises the costs for emigration candidates to obtain a visa.

migrant flows, as well as migrant stocks and bilateral aid flows, thereby affecting the estimated impact of the two variables on migrant flows. As it turns out, the impact of trade flows is not significant, leaving the coefficients of all other covariates substantially unaffected. Given that trade is arguably the most plausible omitted variable from the baseline regression, we interpret this as an indication that our regression model is well specified in terms of the covariates included.

Beside endogeneity concerns, the heterogeneity of foreign aid constitutes a major empirical challenge. Various authors (e.g. Qian, 2015; Bazzi et al., 2012) argue that the impact of aggregate ODA is difficult to interpret as it is comprised of many different types of aid (debt relief, cash transfers, food, etc.) and each type of aid affects a different set of outcomes. Concerning the study of the aid-migration link, only some types of aid (e.g. aid for infrastructure) may lead to sustained positive income effects and thus potentially reduce migration, while others (e.g. emergency aid) may at best raise income in the short run. While resolving this issue would go far beyond the scope of this paper, we offer some significant evidence by examining two specific types of aid, *humanitarian aid* and *technical cooperation*.[10] Similarly to Aleksynska and Peri (2014), we use the fact that the value of ODA labelled as "humanitarian" according to the OECD-DAC classification ($\mathrm{Human}_{in,t-1}$), is equal to aggregate ODA ($\mathrm{AggAid}_{n,t-1}$) multiplied by the corresponding share of humanitarian aid ($\mathrm{ShareHuman}_{n,t-1,}$), i.e. $\mathrm{Human}_{in,t-1}=\mathrm{AggAid}_{n,t-1}*\mathrm{ShareHuman}_{n,t-1}$. Hence, by taking logs and using log properties, we can separate the effect into two terms: $\ln(\mathrm{AggAid}_{n,t-1}) + \ln(\mathrm{ShareHuman}_{n,t-1})$. The same holds for technical assistance. The advantage of this type of specification is that it builds on previous studies examining the aid-migration nexus, which included the log of aggregate ODA as a covariate in a gravity setup. Furthermore, in our pooled OLS setting, aggregate ODA absorbs common factors that affect aggregate ODA as well as migration, allowing us to isolate and disentangle the extra impact of *humanitarian aid* on migration flows within the same specification. The results reported in Table 4 indicate that the negative effect of ODA on migration seems to be predominantly driven by *non-humanitarian aid*, such as *technical cooperation*. Indeed, increasing the share of humanitarian aid over total ODA received has a positive additional effect on emigration, other factors being constant. We interpret this finding as

[10] "Humanitarian aid is assistance designed to save lives, alleviate suffering and maintain and protect human dignity during and in the aftermath of emergencies. To be classified as humanitarian, aid should be consistent with the humanitarian principles of humanity, impartiality, neutrality and independence. Humanitarian aid includes: disaster prevention and preparedness; the provision of shelter, food, water and sanitation, health services and other items of assistance for the benefit of affected people and to facilitate the return to normal lives and livelihoods; measures to promote and protect the safety, welfare and dignity of civilians and those no longer taking part in hostilities and rehabilitation, reconstruction and transition assistance while the emergency situation persists. Activities to protect the security of persons or property through the use or display of force are excluded. It includes aid to refugees in developing countries, but not to those in donor countries. Relief food aid comprises supplies of food, and associated costs, provided for humanitarian relief purposes" (OECD 2000).

consistent with the income channel interpretation: the indirect negative effect on migration through a rise in income is more likely in the case of non-humanitarian or developmental aid than humanitarian aid, which aims mainly at providing temporary relief.[11] Furthermore, the major innovations of our paper as compared to Berthélemy et al. (2009) are that we include the time dimension of the aid-migration link and employ migrant flows rather than stocks as the dependent variable. To check whether these changes are decisive for our findings, we re-estimated Equation (8) for yearly cross-section regressions, alternatively taking log emigration rates and log migrant stocks as dependent variables. Table 5 reports the results. We show only the estimates for our variable of interest, $\ln(\mathrm{AggAid}_{n,t-1})$, while all the other statistics are available upon request. As shown in columns 1 and 2, the coefficients of $\ln(\mathrm{AggAid}_{n,t-1})$ exhibit a negative sign in all cross-sections and for both econometric techniques, as long as the log of emigration is kept as the dependent variable. However, if we replace the log emigration rate by the log of the stocks of immigrants, the coefficient of our variable of interest becomes positive and statistically significant throughout, irrespective of whether OLS or 3SLS is applied (columns 3 and 4). The coefficient maintains its positive sign when we perform a Pooled OLS analysis.[12] Hence, we can interpret the discrepancies between our results and those obtained by Berthélemy et al. (2009) as driven mainly by the choice of different dependent variables. Utilizing stocks as a proxy for migration flows is quite common in the literature (see for instance Moullan 2013); Campaniello, 2014; Grogger and Hanson, 2011; Llull 2011; Belot and Hatton 2012), even though the drawbacks of doing so are evident. Perhaps most importantly in our context, the stock measure includes migrants who had been living in the countries of destination for decades, which tells little about the influence of recent ODA flows on the decision to migrate.[13] Furthermore, using stocks as the numerator to calculate emigration rates is in contrast with the underlying micro-foundation of the gravity equation, unless one assumes a frictionless world (Beine et al., 2015). A popular alternative – adopted for instance by Beine and Parsons (2015) – is to consider variations in migrant stocks as a proxy for gross flows. While this strategy undoubtedly allows dealing with larger datasets, it gives rise to several empirical problems as highlighted by Beine et al. (2015): in contrast to emigration rates, which are positive by definition, variations in stocks can take on negative values. Furthermore, variations in stocks are

[11] The positive sign of the share of humanitarian aid may also be driven by other factors associated with the specificity of this type of ODA. For instance, humanitarian aid is predominantly directed towards people who are often not in the financial condition to reach their preferred destination: hence, the level of emigration towards OECD countries would be very low even in the presence of relatively high levels of ODA. However, since our findings indicate that foreign aid is even more effective in stemming emigration in conflict situations i.e. contexts characterized by extreme situations of violence and poverty, we reckon that the income channel interpretation should be considered more relevant for interpreting the positive sign.

[12] Note that the aid equation for the yearly cross-sections shown in Table 5 includes origin-time fixed effects.

[13] Berthélemy et al. (2009) themselves state that "since we are interested in the impact of aid flows on migration, ideally we would rely upon migration flow data".

also affected by factors such as return migration, deaths, migration to third countries as well as naturalization – depending on whether the status of immigrants is defined according to his or her citizenship – and births – depending on whether the *ius sanguinis* is adopted in the country of destination.

A final set of robustness checks is based on alternative definitions of the aid and governance variables. Specifically, we use net total aid rather than gross total aid as this may better capture actual resource flows to recipients; and we use voice and accountability and regulatory quality instead of political stability to represent other dimension of governance. Replacing gross disbursements by net disbursements leaves all results qualitatively unaffected, with only minor changes in estimated coefficients (see columns 1-3). Likewise, introducing the two other governance indicators hardly affects the coefficients of all other covariates (see column 4). The indicators themselves are negatively – and significantly in the case of regulatory quality – associated with emigration rates, i.e. better governance reduces migrant flows as previously shown for political stability in the baseline specification.

5. Concluding remarks

In this paper, we have revisited the aid-migration link based on a gravity model of international migration. In contrast to the previous literature, our empirical results point to a robust negative relationship between aggregate aid received and emigration rates. We also find that, at the level of individual donors, (positive) network effects and (negative) income effects of aid on migration tend to cancel out, which suggests that (negative) spillovers from one donor's aid to another donor's immigration rates play a significant role. Taken together, this gives the impression that policymakers in rich countries are right to view foreign aid as an appropriate instrument to curb the flow of migrants, but that they would have to act collectively. It has to be noted, however, that the aggregate results presented here can only provide a very rough guide for policymaking, because of the heterogeneous impacts of different types of foreign aid, which we illustrate by drawing a distinction between the effects of humanitarian and non-humanitarian aid on migrant flows in one of our robustness checks. A sectorally disaggregated analysis would constitute an important step towards arriving at more nuanced policy conclusions. To the best of our knowledge, the only study that applies such an approach to investigate the aid-migration link is by Moullan (2013), who examines the impact of foreign health aid on the emigration rates of physicians. He concludes that aid targeted at the health sector could be a potent weapon against the medical brain drain. Additional studies along these lines would help establish a more complete picture of the relationship between aid and migration. Further research is also needed to better understand the exact transmission mechanisms through which foreign aid affects migrant flows.

References

Acht, M., Barsbai, T., and Thiele, R. (2015). Corrupt Governments Do Not Receive More State-to-state Aid: Governance and the Delivery of Foreign Aid through Non-state Actors. *Journal of Development Economics* 114: 20-33.

Adams, R., and J. Page (2003). International Migration, Remittances and Poverty in Developing Countries. World Bank Research Working Paper 3179, Washington, D.C.

Adserà, A., and M. Pytliková (2015). The role of languages in shaping international migration. *Economic Journal* 125(586): F49–F81.

Aleksynska, M., and G. Peri, (2014). Isolating the Network Effect of Immigrants on Trade. *The World Economy* 37(3): 434-455.

Anderson, J., van Wincoop, E., (2003). Gravity with gravitas: a solution to the border puzzle. *The American Economic Review* 93 (1), 170–192.

Anderson, J. E. and E. van Wincoop (2004). Trade Costs. *Journal of Economic Literature* 42(3): 691–751.

Bazzi, S., R. Bhavnani, M. Clemens, and S. Radelet (2012). Counting Chickens When They Hatch: Timing and the Effects of Aid and Growth. *Economic Journal* 122 (561): 590–617.

Beine, M., and C. Parsons (2015). Climatic Factors as Determinants of International Migration. *Scandinavian Journal of Economics* 117(2): 723-767.

Beine, M., S. Bertoli, and J. Fernandez-Huertas Moraga (2016). A Practitioners' Guide to Gravity Models of International Migration. *The World Economy* 39(4): 496-512.

Beine, M., F. Docquier, and C. Özden (2011). Diasporas. *Journal of Development Economics* 95(1): 30–41.

Belot, M.V.K., and T. J. Hatton (2012). Immigrant Selection in the OECD. Scandinavian Journal of Economics 114(4): 1105-1128.

Bermeo, S.B. and D. Leblang (2015). Migration and Foreign Aid. *International Organization* 69(3): 627–657.

Berthélemy, J.-C., M. Beuran, and M. Maurel (2009). Aid and Migration: Substitutes or Complements? *World Development* 37(10): 1589-1599.

Bertoli, S. and J. Fernandez-Huertas Moraga (2013). Multilateral Resistance to Migration. *Journal of Development Economics* 102 (May): 79–100.

Calì, M. and D.W. Te Velde (2011). Does aid for trade really improve trade performance? *World Development* 39(5): 725-740.

Clemens, Michael (2014). Does Development Reduce Migration? Chapter 6 in Robert Lucas (ed), International Handbook on Migration and Economic Development, Edward Elgar.

Clist, P. (2011). 25 Years of Aid Allocation Practice: Whither Selectivity? *World Development* 39(10): 1724-1734.

Campaniello, N. (2014). The causal effect of trade on migration: Evidence from countries of the Euro-Mediterranean partnership, *Labour Economics* 30(C): 223-233.

European Commission (EC) (2016). European Commission Factsheet, Migration Partnership Framework, a new approach to better manage migration. Brussels.

Faini, R., and A. Venturini (1993). Trade, Aid and Migrations: Some Basic Policy Issues. *European Economic Review* 37(2): 435-442.

Feenstra, R. (2004), *Advanced International Trade: Theory and Evidence*, Princeton University Press, Princeton, NJ.

Gleditsch, Nils Petter, et al. "Armed conflict 1946-2001: A new dataset." *Journal of peace research* 39.5 (2002): 615-637.

Grogger, J., and G. Hanson (2011). Income maximization and the selection and sorting of international migrants. *Journal of Development Economics* 95(1): 42-57.

Gubert, F. (2014). The Discourse and Practice of Co-Development in Europe. In: R.E.B. Lucas (Ed.), International Handbook on Migration and Economic Development. Edward Elgar Publishing.

Hatton, T.J., and J.G. Williamson (2002). What Fundamentals Drive World Migration? NBER Working Paper 9159.

Hoeffler, A., Outram, V. (2011). Need, Merit, or Self-Interest—What Determines the Allocation of Aid? *Review of Development Economics* 15(2): 237-250.

Hühne, P., Meyer, B., Nunnenkamp, P. (2014). Who Benefits from Aid for Trade? Comparing the Effects on Recipient versus Donor Exports. *Journal of Development Studies* 50(9): 1275-1288.

Llull, J. (2011). Understanding International Migration: Evidence from a New Dataset of Bilateral Stocks (1960-2000)," mimeo, Univeristat Aut`onoma de Barcelona.

McFadden, D. (1974). Conditional Logit Analysis of Qualitative Choice Behavior. In P. Zarembka (ed.), Frontiers in Econometrics (New York: Academic Press), 105–42.

Melander, Erik, Therése Pettersson, and Lotta Themnér. "Organized violence, 1989–2015." *Journal of Peace Research* 53.5 (2016): 727-742.

Moullan, Y. (2013). Can Foreign Health Assistance Reduce the Medical Brain Drain? *Journal of Development Studies* 49(10): 1436-1452.

Ortega, F. and G. Peri (2013). The Role of Income and Immigration Policies in Attracting International Migrants. *Migration Studies* 1(1): 47–74.

Parsons, C. R. (2012), Do Migrants Really Foster Trade? The Trade-Migration Nexus: A Panel Approach 1960–2000, World Bank Policy Research Working Paper 6034.

Parsons, C.R. and L.A. Winters (2014). International Migration, Trade and Aid: A Survey. In: R.E.B. Lucas (Ed.), International Handbook on Migration and Economic Development. Edward Elgar Publishing.

Qian, N. (2015). Making Progress on Foreign Aid. *Annual Review of Economics* 7 (1): 277–308.

Rajan, R.G. and A. Subramanian (2008). Aid and Growth: What Does the Cross-Country Evidence Really Show? *The Review of Economics and Statistics* 90(4): 643–665.

Silva, J.S. and S. Tenreyro (2006). The Log of Gravity. *The Review of Economics and Statistics* 88(4): 641-658.

Table 1 – Baseline Regressions: Pooled OLS

Class of Income	(1) $\ln(\text{EMrate}_{\text{in,t}})$ 0^{th} – 100^{th}	(2) $\ln(\text{EMrate}_{\text{in,t}})$ 0^{th} – 100^{th}	(3) $\ln(\text{EMrate}_{\text{in,t}})$ 0^{th} – 100^{th}	(4) $\ln(\text{EMrate}_{\text{in,t}})$ 0^{th} – 50^{th}	(5) $\ln(\text{EMrate}_{\text{in,t}})$ 50^{th}-100^{th}
$\ln(\text{BilAid}_{\text{ni,t}-1})$	0.135***	0.099***	0.093***	0.106***	0.096***
	(17.95)	(15.97)	(16.91)	(12.93)	(12.53)
$\ln(\text{AggAid}_{\text{n,t}-1})$	-0.735***	-0.591***	-0.092***	-0.126***	-0.106***
	(-54.84)	(-42.19)	(-4.45)	(-4.54)	(-3.11)
$\ln(\text{GDP}_{\text{i,t}-1}/\text{GDP}_{\text{n,t}-1})$	0.257***	0.211***	-0.054	-0.235**	0.264*
	(14.30)	(12.10)	(-0.85)	(-2.69)	(2.11)
$\ln(\text{MigStock}_{\text{in,t}-1})$	0.675***	0.503***	0.599***	0.627***	0.561***
	(89.75)	(49.19)	(40.28)	(27.48)	(27.19)
$\ln(\text{dist}_{\text{ni}})$	-0.598***	-0.838***	-0.351***	-0.302***	-0.394***
	(-35.58)	(-45.72)	(-13.22)	(-5.22)	(-13.03)
$\text{Colony}_{\text{ni}}$	0.072	0.509***	0.481***	0.296***	0.701***
	(1.40)	(8.66)	(9.99)	(3.48)	(11.04)
$\text{LangProx}_{\text{ni}}$	0.992***	0.827***	0.445***	0.408***	0.552***
	(20.41)	(18.14)	(10.68)	(7.16)	(5.94)
$\text{Dependency}_{\text{n,t}-1}$	-0.004***	-0.007***	-0.008***	-0.004	-0.004
	(-5.40)	(-8.89)	(-3.69)	(-1.43)	(-1.12)
$\text{PolStability}_{\text{n,t}-1}$	0.162***	0.156***	-0.043*	-0.031	-0.034
	(9.30)	(10.05)	(-1.99)	(-1.00)	(-1.08)
$\text{Conflict}_{\text{n,t}-1}$	-8.327***	-7.674***	1.780***	2.723***	0.960
	(-15.84)	(-15.50)	(3.38)	(3.53)	(1.31)
$\text{AggAid}_{\text{n,t}-1}\text{Conflict}_{\text{n,t}-1}$	0.394***	0.368***	-0.084***	-0.126***	-0.050
	(15.58)	(15.46)	(-3.31)	(-3.40)	(-1.42)
$\text{NatDis}_{\text{n,t}-1}$	-0.082***	-0.070	0.002	-0.002	0.001
	(-30.28)	(-25.94)	(1.11)	(-0.46)	(0.27)
N	14154	14155	14154	7065	7082
a_n			X	X	X
$a_{i,t}$		X	X	X	X
R_{sq}	0.76	0.81	0.91	0.89	0.92

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Robust Standard Errors are included. The model includes the intercept. The estimates are obtained using the STATA *reghdfe* command provided by James Correia. For foreign aid we take the 3-year average for both the bilateral as well as the total ODA received. So bilateral ODA and total ODA received at time $t-1$ is the 3-years average between $t-1$ and $t-3$. The first 3 columns show the estimates of Equation (8) for the whole sample with different sets of fixed effects. The 4th and 5th columns report the estimates for the values below and above the median of GDP PPP Const. US$, respectively

Table 2 – Robustness Check: 3SLS

	(1) $\ln(\text{EMrate}_{in,t})$ $0^{th} - 100^{th}$	(2) $\ln(\text{EMrate}_{in,t})$ $0^{th} - 50^{th}$	(3) $\ln(\text{EMrate}_{in,t})$ 50^{th}-100^{th}
$\ln(\text{BilAid}_{ni,t-1})$	0.131***	0.114**	0.181***
	(5.66)	(2.73)	(6.39)
$\ln(\text{AggAid}_{n,t-1})$	-0.104***	-0.133**	-0.137***
	(-4.14)	(-3.35)	(-3.68)
$\ln(\text{GDP}_{i,t-1}/\text{GDP}_{n,t-1})$	-0.043	-0.244**	0.217*
	(-0.77)	(-2.98)	(2.20)
$\ln(\text{MigStock}_{in,t-1})$	0.584***	0.605***	0.536***
	(74.64)	(47.42)	(53.56)
$\ln(\text{dist}_{ni})$	-0.386***	-0.492***	-0.364***
	(-13.74)	(-6.99)	(-12.77)
Colony_{ni}	0.425***	0.352**	0.531***
	(7.43)	(3.18)	(8.36)
LangProx_{ni}	0.487***	0.378***	0.666***
	(11.75)	(6.73)	(10.86)
$\text{Dependency}_{n,t-1}$	-0.009***	-0.004	-0.007*
	(-4.55)	(-1.61)	(-2.25)
$\text{PolStability}_{n,t-1}$	-0.042*	-0.029	-0.026
	(-2.02)	(-0.92)	(-0.92)
$\text{Conflict}_{n,t-1}$	1.315**	2.777***	0.007
	(2.77)	(4.05)	(0.01)
$\text{AggAid}_{n,t-1}\text{Conflict}_{n,t-1}$	-0.075**	-0.129***	-0.001
	(-2.66)	(-3.91)	(-0.05)
$\text{NatDis}_{n,t-1}$	0.003	-0.002	0.001
	(1.31)	(-0.43)	(0.47)
N	12291	6167	6124
R_{sq}	0.91	0.89	0.92

t statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Robust Standard Errors are included. The model includes the intercept. The estimates are obtained using the STATA *reg3* command. For foreign aid we take the 3 years average for both the bilateral as well as the total ODA received. So bilateral ODA and total ODA received at time $t-1$ is the 3-year average between $t-1$ and $t-3$. The first column reports estimates of Equation (8) for the whole sample. The 2nd and the 3rd columns report the estimates for the values below and above the median of GDP PPP Const. US$, respectively

Table 3 – Robustness Check: Adding Trade Flows

	(1) $\ln(\text{EMrate}_{in,t})$	(2) $\ln(\text{EMrate}_{in,t})$
$\ln(\text{BilAid}_{ni,t-1})$	0.093***	0.092***
	(16.91)	(15.69)
$\ln(\text{AggAid}_{n,t-1})$	-0.092***	-0.079***
	(-4.45)	(-3.72)
$\ln(\text{GDP}_{i,t-1}/\text{GDP}_{n,t-1})$	-0.054	-0.020
	(-0.85)	(-0.31)
$\ln(\text{MigStock}_{in,t-1})$	0.599***	0.599***
	(40.28)	(35.88)
$\ln(\text{dist}_{ni})$	-0.351***	-0.356***
	(-13.22)	(-12.60)
Colony_{ni}	0.481***	0.480***
	(9.99)	(9.27)
LangProx_{ni}	0.445***	0.456***
	(10.68)	(9.92)
$\ln(\text{Trade}_{in-1})$		0.008
		(1.75)
$\ln(\text{Trade}_{ni-1})$		0.006
		(0.70)
$\text{Dependency}_{n,t-1}$	-0.008***	-0.008***
	(-3.69)	(-3.54)
$\text{PolStability}_{n,t-1}$	-0.043*	-0.046*
	(-1.99)	(-2.03)
$\text{Conflict}_{n,t-1}$	1.780***	1.318*
	(3.38)	(2.38)
$\text{AggAid}_{n,t-1}\text{Conflict}_{n,t-1}$	-0.084***	-0.061*
	(-3.31)	(-2.29)
$\text{NatDis}_{n,t-1}$	0.002	0.003
	(1.11)	(1.45)
N	14154	12288
a_n	X	X
$a_{i,t}$	X	X
R_{sq}	0.91	0.91

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Robust Standard Errors are included. The model includes the intercept. The estimates are obtained using the STATA *reghdfe* command provided by James Correia. The first column reports the estimates of Equation (8) for the whole sample, the second column shows the estimates of the same model that include bilateral imports and exports.

Table 4 – Robustness Check: Humanitarian Aid and Technical Assistance

	(1) $\ln(EMrate_{in,t})$	(2) $\ln(EMrate_{in,t})$	(3) $\ln(EMrate_{in,t})$
$\ln(BilAid_{ni,t-1})$	0.093***	0.092***	0.095***
	(16.91)	(16.59)	(17.23)
$\ln(AggAid_{n,t-1})$	-0.092***	-0.084***	-0.218***
	(-4.45)	(-3.92)	(-7.48)
$\ln(ShareHuman_{n,t-1})$		0.028**	
		(3.28)	
$\ln(ShareTechCoop_{n,t-1})$			-0.179***
			(-6.58)
$\ln(GDP_{i,t-1}/GDP_{n,t-1})$	-0.054	-0.086	-0.121
	(-0.85)	(-1.31)	(-1.86)
$\ln(MigStock_{in,t-1})$	0.599***	0.609***	0.600***
	(40.28)	(40.56)	(40.34)
$\ln(dist_{ni})$	-0.351***	-0.329***	-0.346***
	(-13.22)	(-12.85)	(-13.05)
$Colony_{ni}$	0.481***	0.490***	0.477***
	(9.99)	(10.08)	(9.90)
$LangProx_{ni}$	0.445***	0.413***	0.448***
	(10.68)	(10.04)	(10.77)
$Dependency_{n,t-1}$	-0.008***	-0.008***	-0.007***
	(-3.69)	(-3.87)	(-3.54)
$PolStability_{n,t-1}$	-0.043*	-0.033	-0.039*
	(-1.99)	(-1.52)	(-1.77)
$Conflict_{n,t-1}$	1.780***	1.711***	1.110*
	(3.38)	(3.25)	(2.09)
$AggAid_{n,t-1}Conflict_{n,t-1}$	-0.084***	-0.081***	-0.050*
	(-3.31)	(-3.19)	(-1.98)
$NatDis_{n,t-1}$	0.002	0.002	0.002
	(1.11)	(0.84)	(1.02)
N	14154	14154	14154
a_n	X	X	X
$a_{i,t}$	X	X	X
R_{sq}	0.91	0.90	0.91

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Robust Standard Errors are included. The model includes the intercept. The estimates are obtained using the STATA *reg3* command. For foreign aid we take the 3-year average for both the bilateral as well as the total ODA received. So bilateral ODA and total ODA received at time $t-1$ is the 3-years average between $t-1$ and $t-3$. The first column reports the estimates of Equation (8). The second column shows the estimates of Equation (8) for the whole sample which includes the share of humanitarian aid, whereas the third column shows the coefficients of Equation (8) that includes the share of technical assistance.

Table 5 – Robustness Check: Yearly Cross-Sections

Estimator		**OLS**	**3SLS**	**OLS**	**3SLS**
Year	Coefficient	(1) $\ln(EMrate_{in,t})$	(2) $\ln(EMrate_{in,t})$	(3) $\ln(MigStock_{in,t-1})$	(4) $\ln(MigStock_{in,t-1})$
2014:	$\ln(AggAid_{n,t-1})$	-0.510***	-0.506***	0.441***	0.334***
2013:	$\ln(AggAid_{n,t-1})$	-0.483***	-0.456***	0.573***	0.380***
2012:	$\ln(AggAid_{n,t-1})$	-0.624***	-0.569***	0.564***	0.427***
2011:	$\ln(AggAid_{n,t-1})$	-0.658***		0.520***	
2010:	$\ln(AggAid_{n,t-1})$	-0.670***	-0.677***	0.603***	0.609***
2009:	$\ln(AggAid_{n,t-1})$	-0.634***	-0.638***	0.540***	0.512***
2008:	$\ln(AggAid_{n,t-1})$	-0.602***	-0.600***	0.430***	0.313***
2007:	$\ln(AggAid_{n,t-1})$	-0.595***	-0.601***	0.413***	0.244**
2006:	$\ln(AggAid_{n,t-1})$	-0.481***	-0.499***	0.320***	0.231**
2005:	$\ln(AggAid_{n,t-1})$	-0.528***	-0.485***	0.447***	0.317***
2004:	$\ln(AggAid_{n,t-1})$	-0.524***	-0.485***	0.495***	0.339**
2003:	$\ln(AggAid_{n,t-1})$	-0.544***	-0.578***	0.415***	0.284**
2002:	$\ln(AggAid_{n,t-1})$	-0.606***	-0.573***	0.365***	0.284**
2001:	$\ln(AggAid_{n,t-1})$	-0.524***	-0.529***	0.408***	0.147
2000:	$\ln(AggAid_{n,t-1})$	-0.777***	-0.814***	0.331**	0.185
1999:	$\ln(AggAid_{n,t-1})$	-0.531***	-0.471***	0.403***	0.279*
1998:	$\ln(AggAid_{n,t-1})$	-0.692***	-0.613***	0.578***	0.490***
1997:	$\ln(AggAid_{n,t-1})$	-0.685***		0.577***	0.350***
1996:	$\ln(AggAid_{n,t-1})$	-0.776***		0.703***	

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

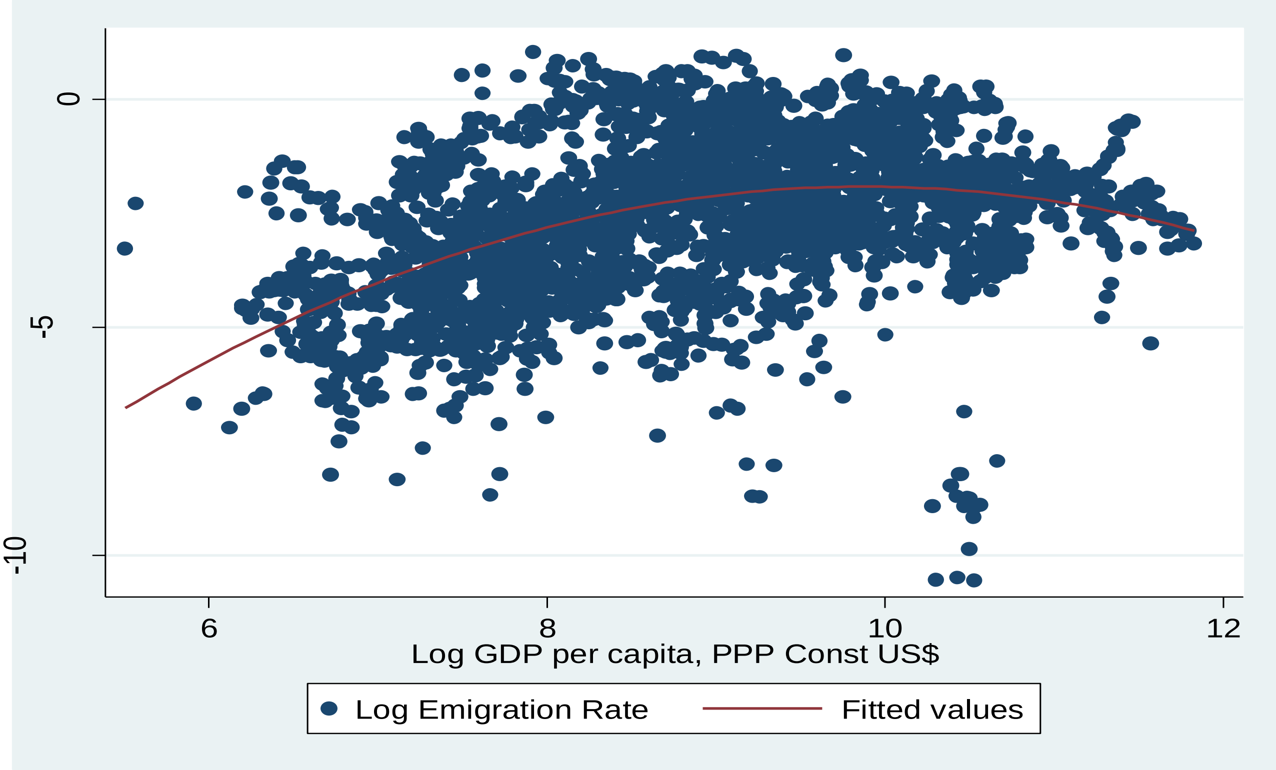
Robust Standard Errors are included. The models include the intercept. The estimates are obtained using the STATA *reghdfe* command provided by James Correia. The table shows the yearly cross-section estimates of Equation (8) both with OLS and 3SLS. Contrary to the estimates of Table 2 based on Equation (9), the aid equation for the system of equations in the yearly cross-section includes origin-year as well as destination-year FE. In the first two columns emigration rates is the dependent variable, whereas in the third and fourth columns it is migration stocks. Information on the rest of the coefficients is available upon request. When left blank, the regression could not be run due to a lack of information.

Table 6 – Robustness Check: Total Net ODA and Alternative Governance Indicators

	(1) $\ln(\text{EMrate}_{in,t})$ $0^{th} - 100^{th}$	(2) $\ln(\text{EMrate}_{in,t})$ $0^{th} - 50^{th}$	(3) $\ln(\text{EMrate}_{in,t})$ $50^{th} - 100^{th}$	(4) $\ln(\text{EMrate}_{in,t})$ 0^{th}-100^{th}
$\ln(\text{BilAid}_{ni,t-1})$	0.095***	0.110***	0.096***	0.095***
	(17.11)	(13.24)	(12.51)	(17.07)
$\ln(\text{AggAid}_{n,t-1})$	-0.105***	-0.184***	-0.058**	-0.090***
	(-6.59)	(-6.69)	(-2.68)	(-5.67)
$\ln(\text{GDP}_{i,t-1}/\text{GDP}_{n,t-1})$	-0.025	-0.235**	0.324*	-0.094
	(-0.40)	(-2.69)	(2.54)	(-1.43)
$\ln(\text{MigStock}_{in,t-1})$	0.596***	0.626***	0.555***	0.597***
	(39.94)	(27.45)	(26.84)	(39.98)
$\ln(\text{dist}_{ni})$	-0.351***	-0.297***	-0.399***	-0.352***
	(-13.17)	(-5.16)	(-13.10)	(-13.19)
Colony_{ni}	0.481***	0.293***	0.705***	0.482***
	(9.99)	(3.46)	(11.09)	(9.95)
LangProx_{ni}	0.438***	0.403***	0.549***	0.438***
	(10.45)	(7.08)	(7.82)	(10.46)
$\text{Dependency}_{n,t-1}$	-0.007***	-0.002	-0.006	-0.007
	(-3.58)	(-0.09)	(-1.77)	(-3.21)
$\text{Voice Accountability}_{n,t-1}$				-0.001
				(-0.04)
$\text{Regulatory}_{n,t-1}$				-0.193***
				(-4.83)
$\text{PolStability}_{n,t-1}$	-0.042	-0.031	0.002	
	(-1.88)	(-1.03)	(0.09)	
$\text{Conflict}_{n,t-1}$	1.535**	2.450***	0.904	1.233*
	(2.89)	(3.25)	(1.22)	(2.31)
$\text{AggAid}_{n,t-1}\text{Conflict}_{n,t-1}$	-0.071***	-0.113**	-0.050	-0.056*
	(-2.81)	(-3.11)	(-1.41)	(-2.21)
$\text{NatDis}_{n,t-1}$	0.001	-0.003	-0.000	0.001
	(0.38)	(-0.86)	(-0.08)	(0.58)
N	13965	7065	6893	13964
a_n	X	X	X	X
$a_{i,t}$	X	X	X	X
R_{sq}	0.91	0.89	0.92	0.91

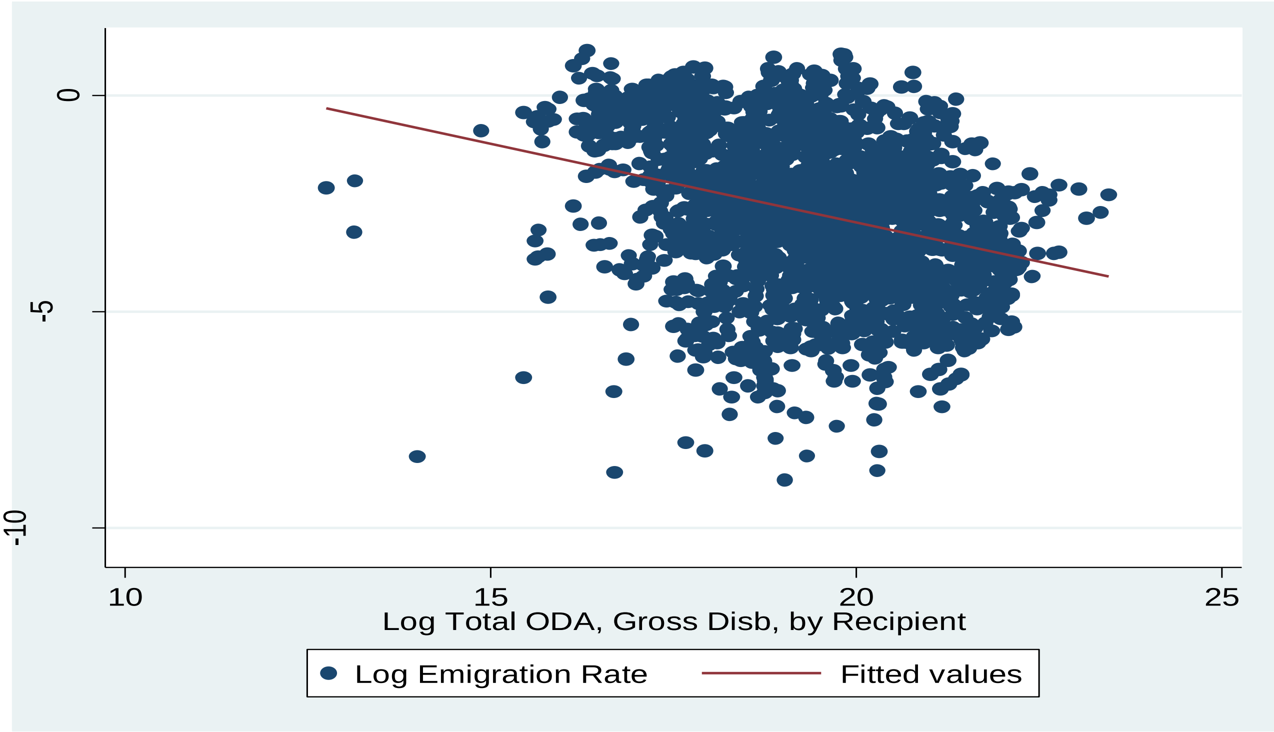
t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust Standard Errors are included. The model includes the intercept. The estimates are obtained using the STATA *reghdfe* command provided by James Correia. For foreign aid we take the 3-year average for both the bilateral as well as the total ODA received. So bilateral ODA and total ODA received at time $t-1$ is the 3-year average between $t-1$ and $t-3$. The first 3 columns show the correspondent estimates reported in Table 1 using Net ODA instead of Gross Disbursements. The fourth column shows the estimates for the whole sample of Equation (8) with alternative measures of Governance Indicators.

Figure 1: Migration Hump – Inverted U shape



Note: On the vertical axis the log of total emigrants over total population by recipient country (time t). On the horizontal axis the log of GDP per capita of the countries of origin expressed in PPP 2011 constant US dollars (time t). The sample is composed of 3529 observations and the data covers the period 1995-2013.

Figure 2: Relationship between ODA and Emigration Rate



Note: On the vertical axis the log of total emigrants over total population by recipient country (time t). On the horizontal axis the log of total gross ODA received by recipient (time t). The left hand side shows the linear relationship, while the right hand side shows the quadratic trend. The sample is composed of 2678 observations and the data covers the period 1995-2013

Figure 3: Relationship between ODA and Emigration Rate at different levels of Income

Note: On the vertical axis the log of total emigrants over total population by recipient country (time t). On the horizontal axis the log of total gross ODA received by recipient (time t). The left hand side shows the linear relationship for the first tertile (2716.129 PPP Const. US$, 856 observations) of the GDP distribution (0^{th}-33^{rd}), while the right hand side reports the same relationship for the last tertile (8168,.954$, PPP Const. US$ 881 observations) of the distribution (66^{th}-100^{th})). The data covers the period 1995-2013.

Table A1: Definition and sources of variables used in the empirical analysis

Variable	Short description	Source
Dependent variable		
$\ln(\mathbf{EMrate}_{in,t})$	Bilateral flows of emigrants over population of country of origin	OECD – International Migration Database
Explanatory variables		
$\ln(\mathbf{POP}_{n,t-1})$	Population, total (in 1,000).	World Development Indicators, World Bank
$\ln(\mathbf{Trade}_{in,t-1})$	Trade flows in current US$ from origin to destination	BACI, CEPII
$\ln(\mathbf{Trade}_{ni,t-1})$	Trade flows in current US$ from destination to origin	BACI, CEPII
$\ln(\mathbf{BilAid}_{ni,t-1})$	Bilateral ODA, gross disbursements in Constant 2014 US dollars (3 years average)	OECD - DAC
$\ln(\mathbf{GDP}_{i,t-1}/\mathbf{GDP}_{n,t-1})$	Ratio of GDP per capita expressed in PPP constant US$ (2011 prices)	World Bank
$\ln(\mathbf{MigStock}_{in,t-1})$	Stock of migrants born in country n and resident in country i	OECD – International Migration Database
$\ln(\mathbf{dist}_{ni})$	Weighted Distance (var: *distw*)	CEPII
$\mathbf{Colony}_{ni}$	Dummy =1 if country pair ever in a colonial relationship, 0 otherwise (var: *colony*)	CEPII
$\mathbf{LangProx}_{ni}$	Language Proximity, continuous variable from 0 to 1	Adserà, A., and M. Pytliková (2015)
$\ln(\mathbf{AggAid}_{n,t-1})$	Total ODA received by country n from all donors , gross disbursements in Constant 2014 US dollars (3 years average)	OECD - DAC
$\mathbf{Dependency}_{n,t-1}$	Age Dependency Ratio, calculated as the total population aged less than 15 or over 64, divided by those of working age	World Development Indicators, World Bank
$\mathbf{Pol\ Stability}_{n,t-1}$	Index ranging from -2.5 to 2.5 with higher value indicating more political stability.	World Development Indicators, World Bank
$\mathbf{Voice\ Accountability}_{n,t-1}$	Index ranging from -2.5 to 2.5 with higher value indicating more political participation.	World Development Indicators, World Bank

Regulatory Quality$_{n,t-1}$	Index ranging from -2.5 to 2.5 with higher value indicating better regulatory quality. [14]	World Development Indicators, World Bank
Conflict$_{n,t-1}$	Dummy =1 in the presence of conflict in the country of origin, 0 otherwise	UCDP Monadic Conflict Onset and Incidence Dataset[15]
NatDis$_{n,t-1}$	Calculated as the total number of natural disasters in a given year[16]	International Disaster Database, Centre for Research on the Epidemiology of Disasters

[14] The Indexes for Institutional Quality such as Political Stability, Voice and Accountability and Regulatory quality are not available for the years 1997, 1999 and 2001: the missing observations are estimated through simple linear interpolation.

[15] Sources: UCDP , Melander et al (2016), Gleditsch et al (2002). Available at http://ucdp.uu.se/downloads/#__utma=1.1404524254.1466678657.1478264508.1479119008.6&__utmb=1.6.10.1479119008&__utmc=1&__utmx=-&__utmz=1.1478264508.5.3.utmcsr=google|utmccn=(organic)|utmcmd=organic|utmctr=(not%20provided)&__utmv=-&__utmk=113218436

[16] It comprises droughts, earthquakes, extreme temperatures, floods, storms, volcanic eruptions, epidemics, insect infestations, and miscellaneous occurrences (i.e., technological accidents of a non-industrial or transport nature)

Table A2 – 3SLS: Aid Equation

	(1) $\ln(\text{BilAid}_{ni,t-1})$ 0th – 100th	(2) $\ln(\text{BilAid}_{ni,t-1})$ 0th – 50th	(3) $\ln(\text{BilAid}_{ni,t-1})$ 50th-100th
$\ln(\text{EMrate}_{in,t})$	0.358^{***}	0.379^{***}	0.376^{***}
	(23.54)	(17.93)	(16.79)
$\ln(\text{Trade}_{in,t-1})$	0.072^{***}	0.091^{***}	0.055^{***}
	(9.76)	(9.49)	(5.00)
$\ln(\text{Trade}_{ni,t-1})$	0.274^{***}	0.220^{***}	0.305^{***}
	(21.42)	(14.09)	(14.07)
Colony_{ni}	1.222^{***}	1.343^{***}	0.954^{***}
	(16.65)	(11.56)	(9.34)
$\ln(\text{AggAid}_{n,t-1})$	0.664^{***}	0.653^{***}	0.700^{***}
	(20.05)	(14.78)	(12.91)
$\ln(\text{GDP}_{n,t-1})$	-0.466^{***}	-0.529^{***}	-0.279
	(-4.41)	(-3.81)	(-1.39)
$\ln(\text{POP}_{n,t-1})$	-0.439	-0.381	0.522
	(-1.65)	(-0.90)	(1.08)
$\text{Pol Stability}_{n,t-1}$	-0.067	-0.141^{**}	0.11
	(-1.70)	(-2.60)	(0.20)
$\text{Voice Accountability}_{n,t-1}$	0.263^{***}	0.193^{*}	0.392^{***}
	(4.03)	(2.12)	(4.29)
$\text{Regulatory Quality}_{n,t-1}$	-0.257^{***}	-0.029	-0.479^{***}
	(-3.85)	(-0.31)	(-4.86)
$\text{Conflict}_{n,t-1}$	0.136^{*}	0.118	0.146
	(2.67)	(1.78)	(1.75)
$\text{NatDis}_{n,t-1}$	-0.000	0.002	0.001
	(-0.07)	(0.34)	(0.14)
N	12291	6167	6124
R_{sq}	0.68	0.67	0.65

t statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Robust Standard Errors are included. The model includes the intercept. The Table reports the estimates of Equation (9). The first column reports the estimates for the whole sample, whereas the second and the third show the estimates for the values below and above the median of GDP PPP Const. US$, respectively