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Abstract

This paper uses geographically disaggregated data to investigate the role of foreign aid as a pull factor for internal migration in Malawi over the period 1998-2008. Employing a standard gravity model of migration, we show a positive relationship between the volume of foreign assistance a district receives and the number of immigrants. While aid makes districts more attractive as migrant destinations, there is no evidence of a corresponding push factor effect on internal mobility. We also dig deeper into the mechanisms through which foreign aid can shape internal migration decisions. According to our results, the positive welfare effects of foreign assistance manifest themselves not only through a rise in economic opportunities, but also in improved access to public services in recipient districts.

Keywords

Foreign Aid, Malawi, Sub-Saharan Africa, Internal Migration

JEL classification: F35, R2, O55

1. Introduction*

Differentials in economic opportunities and in the availability and quality of public services are typically among the main factors influencing the decision to migrate (Lucas, 2015). Migrants tend to move to areas where employment and income opportunities are larger (Harris and Todaro, 1970; Young, 2013), or in which the supply of public services, such as health care and education, is more abundant and of better quality (e.g. Clark et al., 2003; Gollin et al. 2017).

In developing countries, gaps in public services' provision and income opportunities across geographical areas are often related to the spatial distribution of foreign aid. Especially in poor and fragile contexts, governments have been relying on development aid to provide those social and economic infrastructures that are crucial for local population's subsistence and wellbeing.

Indeed, the volume of ODA flows for several least developed countries (e.g. Burundi, Liberia, Malawi) accounts for large shares of gross national income and represents more than those countries can collect through taxes (OECD 2014). Recent studies focusing on geo-localized aid show that development aid is positively associated with healthcare quality (e.g. Kotsadam et al., 2018; Odokonyero et al., 2018), education outcomes (e.g. De and Becker, 2015; Martorano et al., 2020) and economic growth (e.g. Dreher and Lohmann, 2015; Khomba and Trew, 2019).[1]

This paper investigates the role of ODA as a pull factor for internal migration. We argue that the presence of aid projects, particularly in poor and aid-dependent countries, positively influences both monetary as well as non-monetary dimensions of wellbeing at local level. This in turn shapes the incentives to migrate internally and drives population movements. While several recent studies focused on international emigrant flows (e.g. Berthélemy et al., 2009; Lanati and Thiele, 2018; Clist and Restelli, 2020), the impact of foreign development assistance on internal migration remains substantially unexplored. Yet, much of the population movements, especially in developing countries, occur internally rather than internationally. Globally, 1 in 7 people are internal migrants (UNDP, 2009), which is three times as many as international migrants. Furthermore, internal migration is one of the driving forces underlying the rapid demographic change occurring in most developing countries, particularly in Sub-Saharan Africa (Lagakos, 2020). The challenges imposed by rapid urbanization (Henderson and Turner, 2020) call for a better understanding of the factors which influence migration decisions and the role of international donors in shaping the forces that drive population movements.

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[1] These results corroborate previous empirical research at the macro level based on cross-country analysis, which found a positive impact of aid disaggregated along various lines on a range of economic and social indicators (e.g. Mishra and Newhouse 2009; Clemens et al 2012).

Our work focuses on the case of Malawi, which presents some desirable characteristics for this type of analysis. On the one hand, internal migration in Malawi is far more relevant than international migration among both rural and urban households and represents the main driver of urbanization in the country. [2] While most of the country's population still predominantly resides in rural areas, Malawi has one of the highest rates of urban population growth (Anglewicz, 2019) and recent estimates show that internal migrants account for over half of the annual population growth in urban areas (World Bank, 2016). On the other hand, social and economic infrastructures in Malawi are highly dependent on external financial resources. Aid represents approximately 20% of the country's GNI,[3] and it is estimated to account for over three quarters of the country's total development expenditures (Khomba and Trew, 2019). This is especially true as far as the provision of social services is concerned. For instance, recent studies showed that foreign aid accounts for 81% of Malawi's total health expenditure (CHAI, 2015). It is also positively related to the quality of services proxied by a series of health and educational outcomes (De and Becker, 2015; Dolan, 2018). In such a context, foreign aid is likely to significantly shape the spatial differences in the provision of public services and economic opportunities.

Our empirical analysis relies on a standard gravity model of migration (e.g. Ortega and Peri, 2013) where internal bilateral migration flows are regressed on foreign aid volumes at destination. We construct a dyadic matrix over the period 1998-2008, combining information on district-to-district bilateral migration flows (source: IPUMS, 2008 population census) with geo-localized data on foreign aid (source: AidData). In accordance with previous gravity model applications (e.g., Beine and Parsons, 2015; Bertoli and Fernández-Huertas Moraga, 2015), our model is estimated via the Poisson Pseudo-Maximum Likelihood (PPML) estimator. To reduce the risk of model mis-specification and the potential omitted variable bias, we include origin-time and district-pair fixed effects to account for the so-called multilateral resistance to migration (Bertoli and Fernández-Huertas Moraga, 2013). This also fully controls for origin specific and district-pair (time invariant) unobserved heterogeneity.

Since our identification strategy cannot completely rule out measurement errors and potential endogeneity concerns, we provide a series of robustness tests which include different definitions of the variables of interest, alternative specifications, and an instrumental variable (IV) approach. The latter combines a two-step strategy along the lines of Eaton and Kortum (2002) and Head and Mayer (2014) with an IV that exploits the exogenous variation in the supply of ODA weighted by the district's probability of receiving aid (as in Nunn and Qian, 2014; Chauvet and Ehrhart, 2018; Dreher et al., 2019).

Our results reveal a positive impact of foreign aid as a *pull factor* for internal migration in Malawi. This effect is not only statistically significant, but also economically relevant. A simple back-of-the-envelope calculation shows that moving from zero to positive aid inflows (which corresponds to the

[2] See for instance FAO (2017) and Gollin et al., 2017.
[3] This refers to the period 1998-2008. Data retrieved from the World Bank World Development Indicators.

55th percentile of the aid distribution), leads to 22 more migrants per dyad. This roughly corresponds to an additional 660 immigrants per district, which is about 8% of the average number of migrants per district in 2008. In addition, the relationship between aid disbursements and internal immigration is non-linear, as it is characterized by diminishing marginal returns. Therefore, migration decisions appear to be mostly influenced by the presence of aid-supported projects in recipient districts, rather than their size.

Next, we show that the effect of foreign assistance on within-country migration (a) does not vary significantly between men and women; (b) is stronger for younger cohorts of emigrants; (c) is more likely to explain migration to urban areas; (d) is predominantly driven by economic-oriented aid projects; and (e) works/operates exclusively as a *pull*, rather than as a *push* factor for internal migrants.

In the final part of the paper, we identify some of the potential channels at work. We assume that migration choices are mostly driven by economic opportunities and differentials in the provision of public services (Lagakos, 2020). We test for this hypothesis using additional data from different sources. The results suggest that economic development in Malawian districts, which we proxy using variation in nightlight density, is positively associated with volumes of foreign aid. Furthermore, by exploiting survey information available from Afrobarometer, we show that Malawian districts that received more development assistance are also those exhibiting improved indiviudal access to various public services, including education or health facilities, as well as to several types of utilities.

Our contribution to the literature is threefold. First, we complement an existing (but rather small) literature on the link between aid and internal migration, which is almost exclusively confined to the impact of cash transfer or credit access programs (e.g. Ardington 2009; Bryan et Al., 2014; Cai 2020). A common pattern emerging from those studies is that access to such programs favors internal migration by relaxing household's liquidity constraints in the presence of substantial upfront migration costs. The focus on cash transfer and credit access programs is particularly suitable to investigate the budget constraint channel of aid. However, it limits the scope of the analysis to very specific types of assistance, specifically designed to relax liquidity-related constraints. By including the provision of other types of aid, our analysis may capture alternative forces driving the decision to migrate which go beyond the better capacity of would-be-emigrants to finance their moving costs. We thereby complement previous research which shows that the quality of amenities and public services is a rather important determinant of migration decisions (e.g. Dustmann and Okatenko, 2014; Gollin et al. 2017; Henderson and Turner, 2020).

Second, the paper sheds some light on the potential mechanisms linking aid to internal migration. In particular, we test whether the volume of foreign assistance in recipient districts is associated to development outcomes that are likely to shape internal migration flows. This links our paper to the growing and recent literature that uses geo-localized data to evaluate the impact of aid on both economic and social welfare indicators (e.g. Dreher and Lohmann, 2015; Kotsadam et al., 2018).

Finally, to the best of our knowledge, no other works look at the role of official development assistance as a pull factor for internal migration in a developing country. Instead, scholars mostly investigated the controversial role of foreign aid as a push factor for international migration (e.g. Dreher et al., 2019; Clist and Restelli, 2020) given the salience in the policy debate around the issue of how to deal with the rising South-North migration following the so-called refugee crises. Our findings suggest that the welfare enhancing effects of aid-supported projects not only make districts more appealing as internal migrant destinations, but also seem to create more incentives for households to stay in their district of origin, rather than leaving.

The remainder of the paper is structured as follows. Section 2 describes the method and data employed in the econometric analysis and provides some descriptive statistics. Section 3 reports and discusses the regression results, including a number of robustness checks. Section 4 provides several extensions to the main results, while Section 5 digs deeper into the mechanisms through which foreign aid influences migration decisions. Section 6 concludes.

2. Data and Empirical Specification

2.1 Data on Aid Projects

We use data on the precise geographical location of aid-supported projects in Malawi from AidData. The dataset includes donor-reported information on ODA projects, totaling an estimated value of $5.3 billion, covering approximately 80% of total foreign aid reported by the government of Malawi during the period 2000–2011.[4] AidData provides a rich set of information for each specific aid-supported project, including the volume of foreign assistance (committed and disbursed), sectoral and purpose codes, type of assistance, donor and year in which each project was originally agreed as well as the date of its completion.[5]

In this paper we only consider projects completed by the end of 2008 - the latest year for which information on internal migration is available, and whose geographic location is defined with a minimum level of precision.[6] In line with the approach of some recent studies (e.g. Briggs, 2018), we select projects with a precision code of up to 4, which makes it easier to associate the exact location of the project with a specific district, our spatial unit of interest. While this strategy reduces the uncertainty regarding the exact geo-localization of aid-supported projects and attenuates potential issues due to measurement errors, it lowers the number of observations by about 18%.[7]

[4] Further details and information on the dataset are available at the following webpage (accessed on Dec 5, 2019): https://www.aiddata.org/data/malawi-release-17-april-2012

[5] The information on foreign aid projects has been geo-localized using the UCDP/AidData methodology (see Tierney et al., 2011)

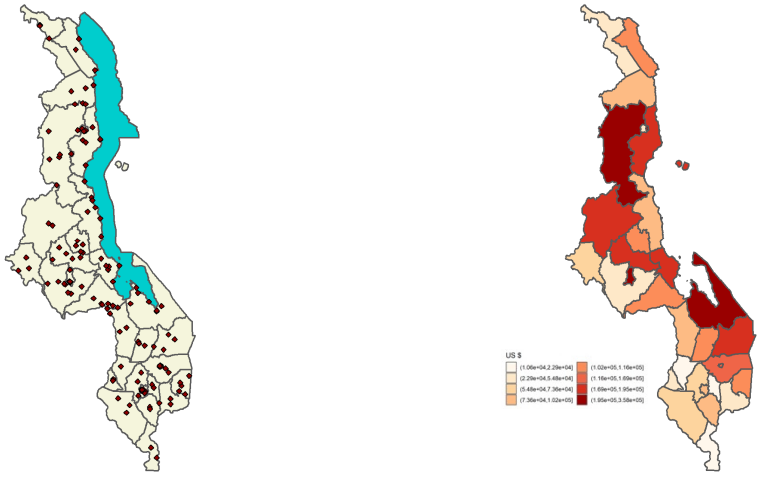
[6] We nonetheless exploit the information on projects that are not yet completed by the end of our sample period (2008) in some robustness checks reported in Table 3

[7] Projects with a precision code higher than 4 are in almost all cases projects that have not been geolocated at all. These includes for the largest part grants directed to the central government in sectors related to Governance.

Our baseline sample includes 65 projects, covering a total of 411 project-locations.[8] Panel (a) of Figure 1 reports the distribution of aid projects in Malawi. The projects are spread almost equally over all districts, with a slight majority of them based in urban areas such as the capital city, Lilongwe (accounting for about 10% of the total), and Zomba (8.8%). Conversely, the aid volumes (Panel b of Figure 1), demonstrate that the larger ODA flows are concentrated in the districts of Karonga, Mangochi, and in Lilongwe district. The largest share of aid disbursements in our sample takes the form of grants (around 70%) and comes from a restricted group of multilateral agencies (African Development Bank, the European Commission, World Bank and FAO) and bilateral donors, namely the US, Norway and Germany.

Figure 1- Aid Projects in Malawi, 1998-2008

Panel a: Location of Aid Projects *Panel b: Disbursements for Concluded Projects*



Notes: The graph includes only completed projects concluded in the period 1998-2008.
Source: Authors' elaboration on AidData.

The top seven donors accounts for about 90% of the total number of projects. As far as the sectoral composition is concerned Figure 2 (Panel a), aid-supported projects in Malawi are highly concentrated in the agricultural sector, and are almost evenly distributed across the other groups. When looking at the size of these projects, however, aid disbursements in rural development and roads, public works and transport make about 60% of the total volume of ODA.

[8] As the information on financial disbursements is only available at the main project level - i.e. reported as the cumulative disbursement of all project-location entries that share the same project code - we evenly split the value of each multi-location project across the different sites involved (as it is standard practice in this literature, see for instance Dreher and Lohman, 2015). All financial disbursements are reported in constant US $.

2.2 Migration Data

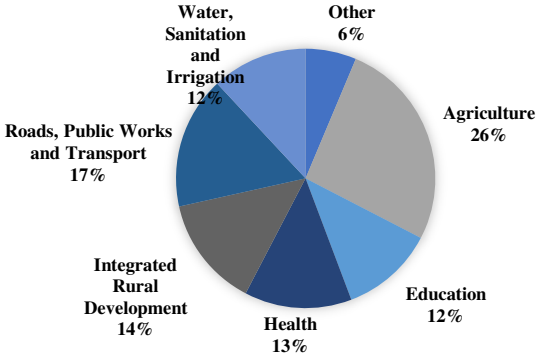
We employ the 2008 Population Census of Malawi[9] to construct a retrospective panel of district-to-district migration over the period 1998-2008.[10] Starting from the census year 2008, we build a dyadic matrix by tracking all individuals who have declared to have moved to the current district of residence from any other districts in a given year. Going backward, we reconstruct the internal migration flows that occurred each year from 1998 to 2008. [11] Formally, we compute annual dyadic migration flows as follows:

$$Mig_{ij,t} = \sum_{p=1}^{n} P_{i,t}[district_{t-1} = j]$$

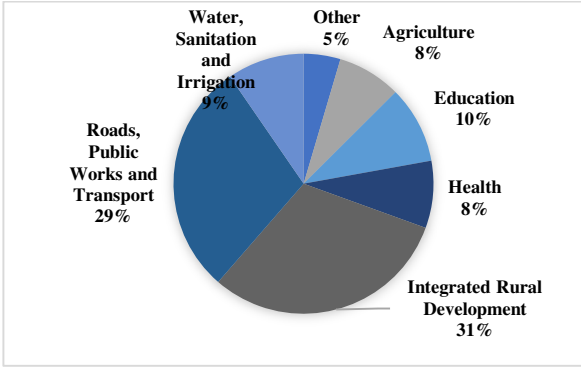
P denotes each individual currently residing in district $i = 1, \dots, n$, who moved from district $j = 1, \dots, n$ $(with\ i\ \neq j)$ in a given year $t = 1998, \dots, 2008$.

Figure 2 - Sectoral distribution of Aid Projects (1998-2008)

Panel a: Number of Concluded Projects



Panel b: Disbursements for Concluded Projects



Source: Authors' elaboration on AidData.

This methodology allows us to cover the whole spectrum of internal migration flows and lead to a dyadic-panel setup that is particularly suitable for gravity model estimations. However, it presents three main concerns. First, this strategy does not allow us to keep track of any intermediate migratory movements by individuals that might have occurred between 1998 (the first year of our sample) and the last declared movement. This issue is likely to be more relevant for later waves of our panel than for

[9] The census was run by the Malawi National Statistical Office, and is distributed by the Integrated Public Use Microdata Series (IPUMS) at the University of Minnesota. From IPUMS, the data are available as a systematic sample of every 10th household with a random start, which was drawn by the Minnesota Population Center to preserve the anonymity of respondents while preserving the representativeness of the data. For additional details on the sampling, see: https://international.ipums.org/international-action/sample_details/country/mw#tab_mw2008a

[10] The census tracks the current place of residence down to Traditional Authorities level, Malawi's lowest administrative division. Nonetheless, we cannot go more granular since the IPUMS anonymization procedure allows to track the previous residence of migrants only at the district level. This limitation also prevents us from considering *within* district movements (for instance, from rural to urban areas), which is itself an important component of internal migration (Becerra-Valbuena and Millock, 2020).

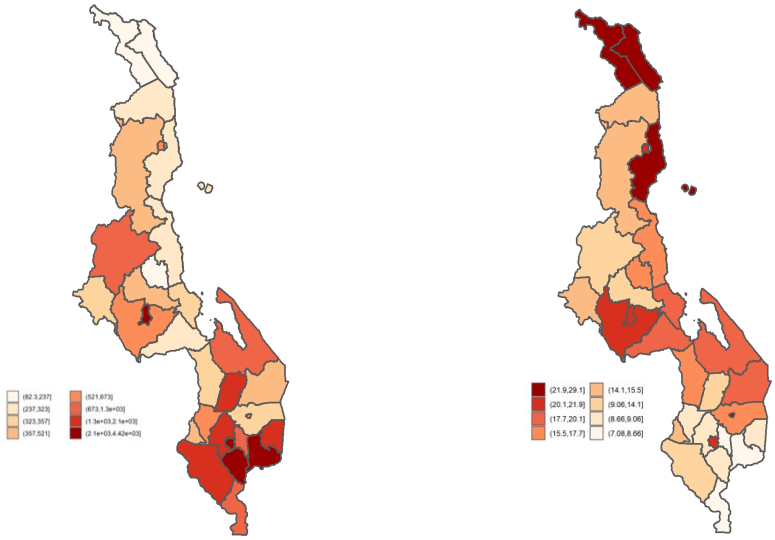
[11] As we identify migrants based on individual respondents, our figures might be affected by some degree of recall bias. Even though this issue is more likely to affect the older waves in our panel than the more recent ones, we assume that 10 years is a short enough period to exclude substantial recall errors.

the earlier ones, as the probability that intermediate migratory steps will be overlooked increases when the latest movement has occurred more recently.[12] Second, we can only rely on information about individuals who were alive at the time of the 2008 census. Hence, the constructed flows are likely to be underestimated, as they do not account for people who migrated during our time-span, but that were not alive in 2008. This measurement issue is plausibly more relevant for earlier waves than for more recent ones.[13] Finally, Malawi's 2008 census did not distinguish between internally displaced people (IDPs) and voluntary migration. This issue could represent a potential threat to our identification, as the routes (and the motivations) followed by IDPs might diverge from those of other migrants. Nonetheless, our data do not exhibit any relevant surge in district-level outflows (which might have been caused by an adverse displacing event) in the period considered.

Overall, Malawi exhibits relatively high internal migration rates. About 40% of the total Malawian population in 2008 (i.e., around 5.2 million people) declared to have changed their district of residence at least once over the course of their life. Among them, slightly less than 3 million persons have changed their district of residence during the decade 1998-2008.

Figure 3 - Migration intensity and Growth by District

Panel a: Migration Intensity (Aggregate flow) *Panel b: Internal Immigrants (Rate of Growth)*



Notes: Shaded areas (from light to dark) denotes immigration intensity (left panel) and immigration growth (right) by district over the period 1998-2008. Source: Authors' Elaboration based on IPUMS data

Figure 3 (left panel) shows that the southern districts represent the most attractive destinations for internal migrants. Such an uneven distribution of immigration flows across geographical areas can be

[12] An example helps clarifying this point: if an individual declares to have moved to its current location in 1998, then we can assume that he/she did not move a second time in the subsequent years. We cannot make the same assumption concerning an individual who declare to have moved to his/her current location in 2008: it could be that this individual had migrated at least another time between 1998 and 2008.

[13] In quantitative terms, though, this is unlikely to represent a major concern. Table A3 in the appendix shows that people aged 65 or more look underrepresented in the group of migrants.

explained by the presence of important economic activities in the south which attracted people from other districts. This includes, for example, large fisheries and fish farms in the southern shore of lake Malawi, as well as the massive agricultural-targeted national investment policy launched by the national government in the early 2000s, which mostly benefited the districts in the south. However, while internal migrants moved – on average – predominantly to the south-central districts and to the capital city, the areas in the North exhibited the highest growth rate of migration inflows over the period 1998-2008 (Figure 3, right panel).

From a demographic perspective, internal migrants in Malawi are distributed equally between men and women (Table A2 in the Appendix). This seems to suggest that even though the determinants of internal mobility in Malawi might differ across genders (Anglewicz et al. 2019), the two groups have equal propensities to migrate. The average migrant tends to be 15 months older than the typical non-migrant (22.6 years of age against 21.3).

2.3 Empirical Specification

Our econometric specification relies on a standard gravity model of migration (e.g. Ortega and Peri, 2013) where internal bilateral migration flows from district *i* to district *j* at time *t* are a function of completed foreign aid projects at destination. Our baseline specification is:

$$\ln(Mig_{ijt}) = \alpha_{ji} + \alpha_{it} + \beta \ln(Aid\ Disbursements_{j:t-1,t-3}) + e_{ijt} \quad (1)$$

Our variable of interest $Aid\ Disbursements_{j:t-1,t-3}$ is the 3-years average volume of aid disbursements for projects that have been concluded in district *j* in the previous three years. Following the existing literature, we take 3-year averages for the aid disbursements received to smooth the volatility of annual aid flows (e.g. Galiani et al., 2017; Moullan 2013). This strategy is justified by the high volatility in the provision of foreign assistance across Malawian districts over time (see Figure A.1 in the Appendix A). Also, we use predetermined values of aid with respect to migration inflows to alleviate potential endogeneity concerns due to reverse causality (e.g. Dreher et al., 2019; Clemens et al. 2012). While our choice on the variable of interest might appear somewhat arbitrary, a series of robustness tests show that our results are consistent across different definitions (number of projects vs disbursements), lags and averages of foreign assistance (see Section 3.2).

The effect of ODA is first estimated without any controls, including only the set of fixed effects along the lines of Beine and Parsons (2017) and Cattaneo and Peri (2016). We deem this parsimonious model to be our preferred specification. Despite the fact that it is potentially prone to omitted variable bias, it has the advantage of not including control variables that could possibly absorb part of the overall aid effect. We subsequently add a limited number of controls to test whether our coefficient of interest is robust to their inclusion. The controls include (i) the size of the migrant network, which is captured

by the pre-determined (one-year lagged) bilateral stocks of migrants from district i living in district j; (ii) the night-time light intensity, which proxies for economic activities at local level (Henderson et al., 2012); (iii) the occurrence of conflicts and the extent of climate shocks, which is measured in terms of Standardised Precipitation-Evapotranspiration Index (SPEI). Table 1 reports the descriptive statistics for the main variables included in the empirical analysis.[14]

The large set of fixed effects included in Equation (1) significantly lowers the risk of model mis-specification and, most importantly, accounts for the so-called multilateral resistance to migration (Bertoli and Fernández-Huertas Moraga, 2013). More precisely, the inclusion of origin-time dummies α_{it} controls for origin specific push factors of internal migration and leads to estimates that are consistent with the assumptions underlying the random utility model (RUM) à la Ortega and Peri (2013). Furthermore, the term α_{ji} absorbs all of the (asymmetric) time-invariant dyadic determinants of internal migration, such as cultural proximity and transport costs, and generates a nest for each district-pair. This further alleviates estimation problems deriving from the potential cross-sectional dependence of the error term (Bertoli and Fernández-Huertas Moraga, 2015). Finally, all specifications are estimated with standard errors clustered at the district of destination level.

Table 1 - Main Descriptive Statistics

Migration: Bilateral Flows and Stocks					
	N	mean	sd	min	max
Migrant Flows (od), t	10054	288.30	1658.03	0	65630
Network (od), t	10054	3954.55	27372.86	0	535300
Aid (different definitions)					
	N	mean	sd	min	max
Disbursement for Concluded Projects $_{j,t}$	10054	2026431	4822938	0	32133124
Number Concluded Projects $_{j,t}$	10054	1.761886	2.926194	0	17
Aid Disbursements$_{j:t-1,t-3}$	10054	1853393	3024883	0	16353139
Number of Aid Projects$_{j:t-1,t-3}$	10054	1.836301	2.534877	0	17
Additional Control Variables					
	N	mean	Sd	min	Max
Nightlights $_{j,t}$	10054	0.688222	1.173775	0.006179	4.975995
Conflict $_{j,t}$	10054	0.326733	0.381061	0	1
SPEI $_{j,t}$	10054	0.243752	0.708976	-1.34018	1.635544

Notes: Descriptive statistics of the main variables included in the baseline specification and in robustness checks **Aid Disbursements$_{j:t-1,t-3}$** (**Number of Aid Projects$_{j:t-1,t-3}$**) refers to the 3-years average of total aid disbursements (total number of projects) concluded in the destination district *j* over the previous 3 years, expressed in constant US$. See Table A1 for the complete list of sources. *Source*: Authors' Elaboration based on different datasets.

In line with existing applications of the gravity model of migration (e.g. Beine and Parsons, 2015; Bertoli and Fernández-Huertas Moraga, 2015), we estimate Equation (1) using Poisson Pseudo-

[14] The network variable is constructed as the number of migrants who moved from district *i* to district *j* before year *t* (and were still resident in district *j* in 2008).

Maximum Likelihood (PPML). The choice of using PPML as our preferred estimator is justified by two main considerations. First, the share of zeros in our dependent variable is approximately 22%, which is large enough to bias the results of standard log-linear fixed effect models (see Santos-Silva and Tenreyro, 2006; 2011). Second, PPML remains consistent in presence of heteroscedasticity (see Head and Mayer, 2014; Santos-Silva and Tenreyro, 2006), and fits well with the utility-maximizing behavior of the migrants under different distributional assumptions (Schmidheiny and Brülhart, 2011).[15]

3. Results

3.1 Baseline Estimates

Table 2 reports the baseline estimates of Equation (1). We start from a specification that only includes our variable of interest, together with the full set of fixed effects (Column 1). We then progressively add other controls, namely the stock of migrants (Column 2), *Nightlights* - as a proxy for economic attractiveness at destination (Column 3) – and the presence of *Conflicts* along with the occurrence of weather shocks (*SPEI*) at destination (Column 4).

Table 2 - Baseline Estimates

	(1)	(2)	(3)	(4)
Estimator	PPML	PPML	PPML	PPML
Dep. Variable	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*
Aid Disbursements$_{j:t-1,t-3}$	**0.008*** **	**0.007*** **	**0.006*** **	**0.006*** **
	(0.002)	**(0.002)**	**(0.002)**	**(0.002)**
Network $_{ij,\ t-1}$		0.360**	0.323**	0.323**
		(0.162)	(0.153)	(0.154)
Nightlights $_{j,t}$			0.074***	0.075***
			(0.021)	(0.021)
Conflict $_{j,t}$				-0.004
				(0.018)
SPEI $_{j,t}$				0.014
				(0.039)
Observations	10,054	10,054	10,054	10,054
% Null	.22	.22	.22	.22
Adj. R2	.96	.96	.96	.96
Pair FE	Yes	Yes	Yes	Yes
Origin*Year FE	Yes	Yes	Yes	Yes

Notes: *** p<0.001, ** p<0.01, * p<0.05 Standard errors clustered by destination in parentheses. The Table reports the results of Equation (1) estimated with PPML with different sets of controls. The variable **Aid Disbursements$_{j:t-1,t-3}$** refers to the 3-year average of total aid disbursements received by the destination district over the previous 3 years (expressed in constant US$) in logs. The additional controls include the stock of migrants from district *i* to district *j* in the previous year (in logs) as a measure of migrants' network; and three measures capturing destination specific time varying factors, such as Average Nightlight intensity, presence of any form of Conflict, and a measure of adverse climatic conditions respectively. See Table A1 for a full description of the controls.

The results suggest that foreign aid is positively associated with bilateral migration inflows. In other words, holding other factors constant, an increase in the provision of aid in a given district makes it a more attractive destination for internal migrants.

[15] In one of our robustness checks, we show that results are very similar when using alternative gravity estimators (see Section 3.3).

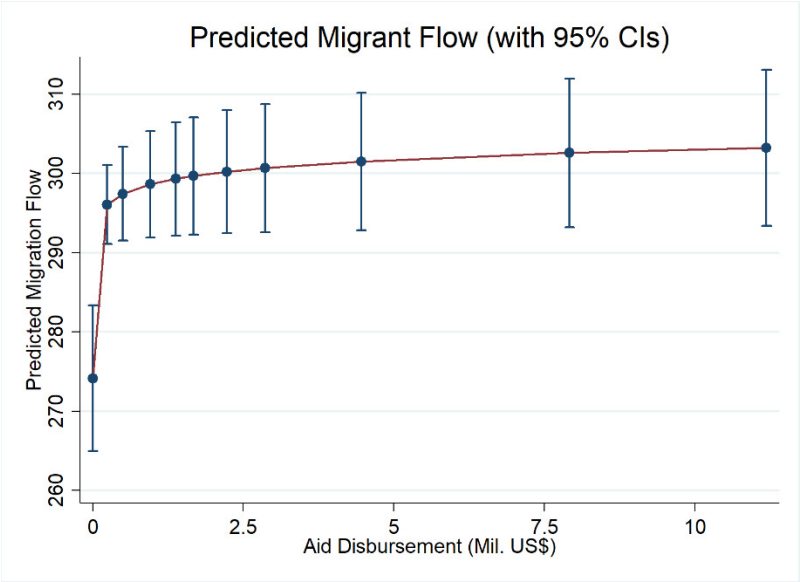
The magnitude of the aid coefficient remains remarkably stable across the different specifications (Columns 1-4). This implies that the monadic control variables in our specification do not take up part of the overall aid effect and therefore do not significantly bias the coefficient in either direction. The network effect always remains statistically significant and with the expected positive sign (columns 2-4). Its elasticity is stable at around 0.3, which is in line with previous studies and confirms the role of pre-existing migrant networks as one of the most important factors favoring migration (see Beine et al, 2016).[16] As expected, economic activities, which are proxied by nightlight density, positively influence the attractiveness of a given district as internal migrant destination. However, there is no evidence of conflicts or climate shocks as having a significant effect on within-country immigration flows.

Looking at our preferred specification, the estimated effect is not only statistically significant, but also economically relevant. Our results show that a 10% increase in the provision of aid to a given district corresponds to a 0.8% rise in the bilateral immigration flows within Malawi. A simple back-of-the-envelope calculation shows that moving from zero to positive aid inflows (which corresponds to moving from the median to the 55th percentile of the aid distribution - an increase of slightly more than 230,000 US$), will lead to 22 more migrants per dyad. This approximately corresponds to an additional 660 immigrants per district, which is about 8% of the average number of migrants per district in 2008. Put differently, a 1000$ increase in aid disbursements from zero is roughly equivalent, on average, to 2.8 additional immigrants in the recipient district. Furthermore, as showed in Figure 4, the resulting *pull factor* effect appears to be mostly driven by the presence of aid-supported projects rather than their size. Indeed, moving from the 55th to the 90th percentile of the aid distribution would only add 6 more migrants per dyad, denoting diminishing marginal returns of aid disbursements.[17]

[16] The magnitude of the diaspora effect for internal mobility in Malawi is very close to the correspondent impact estimated in cross-country studies for international migration (see Beine et al., 2015)

[17] To put it differently, the completion of the first aid project in a district has a large impact on immigration flows. With respect to the no-aid scenario, going from nil to positive aid flows - no matter the amount received afterwards - increases immigration toward a district by 15.2% (on average).

Figure 4 - Quantification



Note: Marginal prediction of the effect of Aid Disbursements for concluded projects at destination (lagged 3-years average) on bilateral FDI. The figure reports the marginal prediction of every 5th percentile from the median to the 99th. Source: Authors elaboration based on baseline estimates (Table 2)

3.2 Robustness

Measurement Issues

As discussed in Section 2.1, the lack of precise information on financial disbursements at the location level and other limitations regarding the quality of the geo-localized aid data, could possibly lead to biases in our estimates. Another potential measurement issue is the strategy of relying on the first lag of the 3-year averages of aid disbursements. While this choice follows the existing literature (e.g. Galiani et al., 2017) and is essentially motivated by the high volatility of aid flows (see Figure A.1 in the Appendix A), we want to make sure it is not driving our results.

Table 3 - Robustness Tests: Measurement Issues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimator	PPML	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Dep. Variable	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*	*Migrant Flows*
Aid Disbursements$_{j:t,t-2}$	**0.008****							
	(0.003)							
Number of Aid Projects$_{j:t-1,t-3}$		**0.130*****						
		(0.019)						
Number of Aid Projects$_{j:t,t-2}$			**0.134*****					
			(0.023)					
Aid Disbursements$_{j,t-1}$				**0.003***				
				(0.002)				
Number of Aid Projects$_{j,t-1}$					**0.058****			
					(0.025)			
Stock of Aid Disbursements $_{j,t}$						**0.102*****		

						(0.017)		
Commitment for Aid Projects$_{j:t-1,t-3}$							**0.007*** ** **(0.002)**	
Disbursement for Incomplete Proj.$_{:t-1,t-3}$								0.000 (0.003)
Observations	10,054	10,054	10,054	10,054	10,054	10,054	10,054	10,054
% Null	.22	.22	.22	.22	.22	.22	.22	.22
Adj. R2	.96	.96	.96	.96	.96	.96	.96	.96
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Origin*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.001, ** p<0.01, * p<0.05. Standard errors clustered by destination in parentheses. All columns estimates the impact of different, alternative definitions of foreign aid on bilateral internal migration, using same econometric specification reported in Column (1) of Table 2 **Aid Disbursements$_{j:t,t-2}$** refers to the 3-year average of total aid disbursements received by the destination district over the current and the previous 2 years (expressed in constant US$). **Number of Aid Projects$_{j:t-1,t-3}$** and **Number of Aid Projects$_{j:t,t-2}$** similarly reports the effect of aid as considered in the baseline and in Column (1), but computed on the number of projects' locations of concluded projects rather than their value. **Aid Disbursements$_{j,t-1}$** and **Number of Aid Projects$_{j,t-1}$** refers to the single-year volume (number) of aid projects, concluded in the destination district *j* in the previous year. **Stock of Aid Disbursements$_{j,t}$** refers to the cumulate disbursements for concluded projects (in constant US$). **Commitment for Aid Projects$_{j:t-1,t-3}$** and **Disbursement for Incomplete Proj.$_{j:t-1,t-3}$** also refers to a lagged 3-years average, but reports the volume of commitments and of incomplete projects respectively (both expressed in constant US$). All aid variables are taken in logs.

We therefore propose a number of robustness tests in which we include several alternative definitions of our variable of interest, namely: (i) the value of projects using the three year average starting at time t, and the 1-year lagged value of disbursements; (ii) the number of projects, using the contemporary or lagged 3-year average as well as the 1-year lagged number. The estimates of this exercise reported in the first 5 columns of Table 3 indicate that the main results of our empirical analysis are not driven by the choice or the definition of our variable of interest. Furthermore, in the last three columns of Table 3 we test whether (a) the effect of foreign assistance on migration decisions depends on the cumulative effects of aid projects; (b) the results hold when using commitments instead of disbursements; and (c) the results are confirmed if projects were agreed but not yet completed by the end of our sample period. While the insignificant coefficient of not yet completed projects (Column 8) rules out the possibility of an "anticipation effect" of aid on internal migration, accounting for past projects (Column 6) this computes the cumulative amount of projects between 1998 and year t and raises considerably the size of the aid coefficient.

Alternative Specifications

In this Section we check whether our results hold against alternative estimators, different econometric specifications, and to different cuts to the sample. [18] Table 4 provides a summary of the main tests performed. Columns (1-2) report the baseline estimates replicated with EK Tobit and a standard log linear OLS model. Columns (3-6) show the PPML results obtained using different combinations of fixed effects. Finally, we test whether our results survive to various cuts of data. More specifically, we remove (a) the top migrant destinations (Column 7); (b) the most frequent bilateral migration routes (Column 8); (c) the top aid recipients (Column 9); and (d) all observations with zero

[18] Other robustness tests - not reported in Table 4 - show that the baseline results hold when using standard errors clustered by different dimensions of the panel. These results are available upon request.

aid inflows (Column 10) from the sample. Overall, this set of robustness tests indicate that our parameter of interest is rather stable across model specifications, estimators and sample selections, and is very close in magnitude to our baseline estimates reported in Table 2. The inclusion of a reduced set of fixed effects, however, leads to changes in the size of the aid coefficient, which is particularly prominent when we exclude origin specific time dummies (Column 3).

Endogeneity Concerns

An important econometric issue in our specification is the potential endogeneity of geo-localized aid projects, which may stem from two different sources: reverse causation and omitted variable bias. Reverse causality could be a concern if, for instance, internal migration shocks triggered by extreme events - such as natural disasters and conflicts - lead to humanitarian responses by donors. To the best of our knowledge, no such disruptive event occurred in Malawi during the period analyzed in this paper, and no sudden changes in the provision of humanitarian aid have occurred in the years 1998-2008. Omitted variables are thus plausibly the most relevant source of bias in the context of our analysis. For instance, the potential omission of unobserved factors, such as changes in the political landscape and/or in socio-economic conditions, might co-determine aid and migration.

Table 4 - Robustness Tests: Alternative Specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Alternative Estimators		***Alternative Sets of Fixed Effects***				***Robustness to sample selection***			
Type of Robustness Test	Pooled OLS	EK Tobit	Pair Only	Pair + T	Pair + O + T	O + T + D	No Top Destination	No Top Migr. Corridors	No Top Recipients	No Zero Aid Flows
Aid Disbursements$_{j:t-1,t-3}$	**0.008****	**0.007*****	**0.040*****	**0.009*****	**0.009*****	**0.009*****	**0.008*****	**0.007*****	**0.008*****	**0.011*****
	(0.003)	**(0.002)**	**(0.005)**	**(0.002)**	**(0.002)**	**(0.002)**	**(0.001)**	**(0.002)**	**(0.002)**	**(0.004)**
Observations	10,230	10,230	10,054	10,054	10,054	10,230	9,064	9,999	9,075	5,436
% Null	-	-	.22	.22	.22	.23	.23	.22	.23	.16
Adj. R2	.85	.85	0.94	0.95	0.95	.35	0.95	.96	.96	.96
Origin*Year FE	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes
District Pair FE	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Year FE	No	No	No	Yes	Yes	Yes	No	No	No	No
Origin FE	No	No	No	No	Yes	Yes	No	No	No	No
Destination FE	No	No	No	No	No	Yes	No	No	No	No

Notes: *** p<0.001, ** p<0.01, * p<0.05. Robust Standard errors clustered by destination in parentheses. With the exclusion of Columns (1) and (2), the dependent variable is the flow of migrants at time t. The dependent variable of the OLS model in Column (1) is *log (1+N)*, where N is the flow of migrants form district *i* to district *j*. The dependent variable in Column (2) is also represented in logs. The data are then considered as left-censored, where the value of the censoring is set to the lower non-null value of bilateral migration recorded for each pair of districts. Columns (3) to (6) report the coefficients from PPML, fitted including different sets of fixed effects (Pair = Origin * Destination; O = Origin; D = Destination; T = Time). The models in Columns (7), (8) and (9) are based on the specification of Column (1) in Table 2 and test the robustness of the baseline estimates to the exclusion of the three top migrant destinations (Blantyre City, Thyolo, Lilongwe City, and Mulanje), the five major bilateral corridors (Thyolo to Balaka, Blantyre to Mulanje, Chikwawa to Blantyre City, Blantyre (District) to Zomba City, and Phalombe to Chikwawa), and the top three aid recipients district respectively (Karonga, Lilongwe (District), and Mangochi). Finally, Column (9) replicates the specification of Column (1) from Table 2, but limiting the sample to the period 2002-2008 (that is, removing the years in which no aid projects among those considered was concluded).

This is particularly compelling in our analysis as we are only able to include a limited set of district specific controls given constraints in terms of data availability in Malawi.

Potential endogeneity concerns are traditionally addressed by means of an instrumental variable (IV) approach. However, the presence of a monadic endogenous variable in a dyadic setting as in Equation (2) makes the IV approach hardly viable in practice, as the instrument should have an *ijt* dimension to qualify. An attractive solution is to implement an instrumental variable (IV) approach using a two-step strategy along the lines of Eaton and Kortum (2002) and Head and Mayer (2014). This approach is formally described in Appendix B.

Following the existing literature on aid effectiveness (Nunn and Qian, 2014; Chauvet and Ehrhart, 2018; Dreher et al., 2019), we build an instrument that exploits the exogenous variation in the supply of aid weighted by the district's probability of receiving aid. More precisely, we interact a district-specific time invariant variable - the probability of each district to receive aid from a particular donor *k* over the period considered, $\overline{p_{j,k}}$ – with a time varying variable – the total volume of aid disbursements delivered by all donors to all recipients (except Malawi), with at least one project in district *j* in year *t*. Details about the construction and the characteristics of the IV, including a discussion regarding its validity (relevance and exogeneity) are reported in Appendix B. Table 5 reports the estimates of the 2-step approach described in the Appendix B and the IV.[19] Results of the 2-Step PPML (Column 1) essentially confirm the findings of our baseline estimates. Once endogeneity is accounted for (Column 2), the aid coefficient significantly increases. This denotes potential sources of bias in the data and suggests that the baseline results should be interpreted as a lower bound of the "true" effect of foreign assistance.

Table 5 - Robustness Tests: Two-Step Strategy / IV Method

	(1)	(2)
Estimator	PPML	IV-PPML
Stage	II Step no IV	II Step IV
Dep. Variable	*Migrant Flows*	*Migrant Flows*
Aid Disbursements$_{j:t-1,t-3}$	**0.008*** **	**0.066*** **
	(0.002)	**(0.025)**
Observations	342	342
Adj. R2	.99	-
Destination FE	Yes	Yes
Year FE	Yes	Yes
Kleibergen-Paap F-stat	-	16.46

Notes: *** p<0.001, ** p<0.01, * p<0.05 Robust Standard errors clustered by destination in parentheses. The Table Reports the second step estimates obtained via PPML (Column 1) and IV-PPML (Column 2), respectively. The reported number of observations refer to the number of distinct district-specific FE estimates from the first stage regression. See Table B1 in the appendices for the first stage estimates.

[19] The estimates are computed using a control function approach as in Dreher et al., 2019).

4. Extensions

4.1 Sectoral Aid

Several authors (e.g. Clemens et al., 2012; Qian, 2015) argue that the impact of aid is difficult to interpret as it encompasses many different types of aid and each type affects a different set of outcomes. Indeed, as reported in Section 2.1, completed aid projects in Malawi span over diverse sectors. This includes some of the 'early-impact' type (Clemens et al., 2012), which can foster internal migration under the promises of short term economic opportunities, as well as other projects, whose attractiveness grounds on opportunities of access to public services that are not available in the place of origin. To investigate the heterogeneous impact of aid on migration, we group the projects on the basis of their Creditor Report System (CRS) sectoral codes, mostly focusing on the distinction between projects in social infrastructure/services and economic infrastructure/services.[20]

In Table 6 we firstly replicate our baseline results by separately estimating the impact of aid in economic and social infrastructures - along with projects that do not fall in any of these two categories (Column 1-3).[21] We then include all sectoral categories within the same regression (Column 4). The results show that aid projects in economic infrastructures – mostly in the transport sector and agriculture (see Section 2.1) – are those which make districts more attractive for internal migrants in Malawi. consider these results to be plausible, since aid-supported projects in the economic sector are more likely to create income and employment opportunities for the local population. Conversely, we do not find a significant effect for aid in social infrastructures and other sectoral projects (though their coefficients remain positive). While these findings are somewhat indicative of the types of aid projects that mostly affect migration decisions, they must be interpreted with caution, given the strong interdependencies across aid categories.

4.2 Migrants' characteristics

The results discussed so far point towards a positive impact of foreign aid on migration inflows. However, this relationship might be heterogeneous between rural and urban areas as well as across

[20] The classification follows the recent work by Martorano et al. (2020) on the impact of Chinese aid on household welfare in Africa. The grouping strategy is inspired by the work of Clemens et al (2012), who first identified early-impact aid projects. Economic projects include (CRS code in parenthesis): Transport and Storage (210); Communications (220); Energy Generation and Supply (230); Banking and Financial Services (240); Business and Other Services (250); Agriculture, Forestry and Fishing (310); Industry, Mining, Construction (320); Trade and Tourism (330). Social projects include: Education (110); Health (120); Population Policies (130); Water Supply and Sanitation (140); Government and Civil Society (150); Other Social Other Social Infrastructure and Services (160); Women in Development (420); Developmental Food Aid (520); Non-Food Commodity Assistance (530). Other Social Infrastructure and Services (160); Women in Development (420); Developmental Food Aid (520); Non-Food Commodity Assistance (530). Infrastructure and Services (160); Women in Development (420); Developmental Food Aid (520); Non-Food Commodity Assistance (530).

[21] This category includes a very small fraction of total projects in our sample (also see Figure 1). Among them there are projects that do not fit into any of the previous categories due to their generic sectoral allocation (e.g., CRS codes 430 "Other Multisector") or projects that have not been allocated to any CRS code. This residual category mostly includes multi-purposed coded projects, the main of which is a $ 21 million project funded by the EU, spanning over 12 different locations in Malawi with the distribution of small projects in different sectors, including health, education, production and community development.

different migrant characteristics, such as gender and age. Given the rapid urbanization that Malawi has been experiencing over the last 2 decades, we expect the overall aid effect to be driven by urban destinations. Additionally, Anglewicz (2019) showed that there is no evidence of gender polarization in Malawi's internal mobility, with men primarily moving for work and women more likely to move for marriage related reasons. Furthermore, the results reported in Table 6 suggest that aid appears to be a more effective determinant for employment-induced migration. Lastly, as showed in Table A3, in Malawi the younger cohorts of the population and people in the working age are those more likely to move internally. Hence, in light of these considerations, we expect the presence of aid projects to be particularly effective in attracting men, younger cohorts and working age population from other districts.

Table 6 - Disaggregated Analysis: ODA by Sector

	(1)	(2)	(3)	(4)
Estimator Dep. Variable	PPML *Migrant Flows*	PPML *Migrant Flows*	PPML *Migrant Flows*	PPML *Migrant Flows*
Disbursement for Social Projects$_{j:t-1,t-3}$	0.003			0.001
	(0.003)			(0.003)
Disbursement for Economic Projects$_{j:t-1,t-3}$		**0.010****		**0.017*****
		(0.003)		**(0.005)**
Disbursement for Miscellaneous Projects$_{j:t-1,t-3}$			0.003	0.001
			(0.003)	(0.003)
Observations	10,054	10,054	10,054	10,054
% Null	.22	.22	.22	.22
Adj. R2	.96	.96	.96	.96
Pair f.e.	Yes	Yes	Yes	Yes
Origin * year f.e.	Yes	Yes	Yes	Yes

Notes*** p<0.001, ** p<0.01, * p<0.05 Standard errors clustered by destination in parentheses.

By exploiting census data on the age, gender and the urban/rural status of each respondent, we test these hypotheses in Table 7. More precisely, we perform a seemingly unrelated regression exercise and test for the statistical equality (Wald Test Chi2 - p-val from seemingly unrelated regressions) of aid coefficients across the different samples. The results are fairly consistent with our predictions: the effect of aid is most likely to materialize when projects target urban areas (Columns 6-7) and is significant for both genders (Columns 1-2), although with a higher coefficient for males.[22] As for age cohorts, while the effect of aid appears to be stronger for younger cohorts of the population (including those in the working age) (Columns 3-5), we cannot reject the null hypothesis on the effect being constant across age groups (p-val=0.16).

[22] Notice that with mostly urbanized areas we are considering the districts that have more than average respondents declaring to leave in a non-rural area.

Table 7 - Disaggregated Analysis: Different Types of Migrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Estimator	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Dep. Variable	*Migration (Men)*	*Migration (Women)*	*Migration (Youth)*	*Migration (Work.)*	*Migration (Old)*	*Migration (Urban)*	*Migration (Rural)*
Aid Disbursements$_{j:t-1,t-3}$	**0.010*** **	**0.006*** **	**0.008*** **	**0.007*** **	**0.007**	**0.006***	0.005
	(0.002)	**(0.002)**	**(0.002)**	**(0.002)**	**(0.002)**	**(0.003)**	(0.003)
Observations	9,966	9,790	9,647	10,032	4,750	1,320	8,734
% Null	.22	.2	.37	.27	.74	.09	.24
Adj. R2	.94	.94	.97	.87	.4	.97	.96
Pair f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Origin * year f.e.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Test Chi2 (p-val)	12.389324 (0.00)			0.16 (0.69)		3.97 (0.04)	

Notes: *** p<0.001, ** p<0.01, * p<0.05. Robust Standard errors clustered by destination in parentheses. Column (1) and (2) report the estimates of Equation (1) for men and women migrants. Columns (3), (4) and (5) report the estimates for young migrants (less than 16y.o), working age population (between 16 and 64), and old age migrants (more than 64 y.o.). Columns (6) and (7) show the estimates for districts of destination classified as being predominantly urban or rural.[23]

4.3 Aid as a Push Factor

In this last sub-section, we test whether aid projects influence emigration decisions in the districts of origin i.e. whether foreign aid shapes internal migration patterns also through a *push* (or *retention*) *factor* effect. Theoretically speaking, the same welfare-enhancing opportunities created by development assistance , which make a district of destination relatively more attractive with respect to alternative locations, could in principle favor emigration by enabling a larger share of the population in the districts of origin to finance migration costs (*Budgetary Constraint Channel*). Under different assumptions, such opportunities could also lead to more incentives to reduce emigration through increasing opportunity costs and diminishing the net benefits of migration (*Income Channel*). Recent empirical research focusing on international emigration collected some evidence in favor of the latter hypothesis, although the findings point towards a quantitatively small impact of foreign aid (see for instance Lanati and Thiele 2020 and Clist and Restelli 2020).

Table 8 - Aid as a Push Factor

	(1)	(2)
Estimator	PPML	IV-PPML
Dep. Variable	*Migrant Flows*	*Migrant Flows*
Aid Disbursements$_{j:t-1,t-3}$	0.003	**-0.002***
	(0.002)	**(0.001)**
Observations	10,054	342
% Null	.22	.22
Adj. R2	.96	.96
Pair f.e.	Yes	Yes
Dest * year f.e.	Yes	Yes

Notes*** p<0.001, ** p<0.01, * p<0.05 Standard errors clustered by destination in parentheses.

[23] The distinction is based on the information provided by the census, which reports the rural/urban status of each respondent. We have grouped districts according to the share of individuals living in urban areas in 2008. Using the sample mean (around 10%), we classified as "urban" the districts reporting higher shares and "rural" all the others. The group of urban districts corresponds to those hosting the major towns of the country, e.g. Karonga, Rumphi, Mzuzu, Lilongwe City, Mwanza, Zomba City, Blantyre City. The data are fairly consistent with national level data from the World Development Indicators, which report that the rural population accounted for around 85% of the total in 2008 (see: https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=MW , accessed on November 16th, 2020).

In order to correctly identify the impact of aid projects on emigration, we replace origin-year with destination-year fixed effects in our baseline gravity equation. We also provide the corresponding IV estimates, obtained by applying the same strategy and instrument employed in Table 5 to the aid received by the district of origin.[24] The estimates reported in Table 8 point toward a null impact of ODA on district-level emigration (Column 1), i.e. an increase in the size of aid at district level is associated with no variation in the emigration rates. When instrumented, the effect of aid even turns negative, which seems to suggest that providing higher amounts of aid lowers the incentives for the local population to emigrate.[25] Taken together, these findings appear to be at odds with the budgetary constraint channel and the positive role of aid in favoring emigration by enabling a larger share of the population to finance their moving costs.

5. Transmission channels

In this section, we dig deeper into some of the potential channels through which foreign aid can affect internal migration decisions in Malawi. Specifically, we empirically test two potential mechanisms: the capacity of aid to create local economic opportunities and its role as a source of amenities and public services at district level.

5.1 Economic Opportunities

The potential role of aid as determinant of internal migration is partly grounded in its capacity to spur economic growth. While the literature on the aid-growth nexus at macro-level is inconclusive (see Arndt et al., 2010), there seems to be some consensus on a positive relationship in the recent studies based on more refined information on aid projects at sub-national level. For instance, a recent paper by Khomba and Trew (2019) shows that economic growth in Malawian districts is positively influenced by the volume of aid inflows. They argue that aid is likely to be a major instrument in leveraging economic growth in the country, as it accounts for more than 70% of the overall development spending. Using the same data on geo-localized aid projects employed by Khomba and Trew (2019), we regress the growth rate of nighttime light (NTL) density on the volumes of aid received at district level. NTL density proxies for the intensity of economic activities at geo-localized level and is commonly used in the literature (see Henderson et al., 2012). The regression includes district and year fixed effects, with standard errors clustered at the district level. The results reported in Table 9 (Column 1) show that aid-supported projects are positively related to economic growth at district level. This finding corroborates with the results of the disaggregated analysis (Table 6), and generally supports our hypothesis on the

[24] Our instrument is obtained as a shift-share, computed as the district-level summation of the total ODA disbursed globally by every donor operating in Malawi (net of the spending in Malawi itself), multiplied by the probability for that donor to be present in a certain district in a given year.

[25] This is consistent with the existing evidence linking aid to internal migration in Malawi (see Miller Runfola and Napier, 2016)

significant role of aid on internal migration decisions through the creation of greater economic opportunities.

5.2 Public Services Provision

Next, we look at the capacity of aid-supported projects to provide access to specific types of public services, such as health care facilities, schools and basic infrastructures, that can plausibly affect the decision to migrate internally (see Dustmann and Okatenko, 2014; Gollin et al., 2017). To test whether aid matters for the provision of public and social services to the local population, we employ individual data from rounds 3 and 4 of the Afrobarometer Survey. The survey covers a total of 2,384 individuals for Malawi, based in 68 and 69 clusters in the years 2005 and 2008.[26]

We focus on the following facilities: *Schools*, *Health Clinics*, *Electricity*, *Piped Water* and *Sewage Systems* and use information on whether a given facility is "*…present in the primary sampling unit/enumeration area, or within easy walking distance*". We employ a linear probability model in which individuals' responses (0 or 1) are regressed on aid volumes received by the district where the household resided at the time of the survey (2005 and 2008).[27] All regressions control for individual characteristics (gender, age, residence in rural/urban areas) as well as district and time fixed effects. The results reported in Table 9 (Columns 2-6) suggest that the probability for an individual to live in proximity of some key facilities is generally higher in locations which receive larger volumes of foreign aid.

Table 9 - Mechanisms

	(1)	(2)	(3)	(4)	(5)	(6)
Mechanism	*Growth*	*Public services*				
Dep. Variable	*Avg. Nightlight*	*School*	*Clinic*	*Electricity*	*Pipes*	*Sewer*
Aid Disbursements$_{j:t-1,t-3}$	**0.001****	**0.027*****	**0.016***	**0.021****	**0.039*****	**0.039*****
	(0.001)	**(0.006)**	**(0.007)**	**(0.007)**	**(0.006)**	**(0.006)**
Observations	186	2,209	2,209	2,209	2,209	2,209
R-squared	0.89	0.895	0.457	0.521	0.538	0.456
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District f.e.	Yes	Yes	Yes	Yes	Yes	Yes
Year f.e	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.001, ** p<0.01, * p<0.05, + p<0.10. Robust Standard errors clustered by destination in parentheses. The specification reported in Column (1) is estimated as a pooled OLS with district and time FE, and include a set of district level controls (Population density, SPEI, conflict). The dependent variable – the Average Nightlight – has been obtained from NOAA's satellite data, while population density comes from Harari and La Ferrara (2018), and has been computed in the same way as the SPEI and the conflict related variables (See the note to Table A1). Columns (2) to (6) refer to individual respondents to the Afrobarometer survey (Rounds 3 and 4), and are estimated using a Linear Probability Model. The dependent variable in each column takes the value of 1 if the related infrastructure (School, Health Clinic, access to Electricity Grid, Piped Water and Sewage System) is located within easy walking distance or if the respondent has easy access to them. All equations from (2) to (6) include district and time fixed effects, in addition to a set of individual characteristics (gender, age, rural/urban location), and are weighted using the sample weights (also provided by Afrobarometer).

[26] Enumeration areas for each Afrobarometer survey location are fully consistent with the AidData procedure (BenYishay et al., 2017). Afrobarometer follows a random selection process designed to generate a representative cross section of the population of voting age in each country. The sampling is based on geographic primary sampling units that form the Enumeration Areas (EA). Such units are selected with a probability proportional to their population size. A respondent is selected within a randomly selected household for each EA. Gender balance in the sample is ensured by alternating men and women in consequent interviews.

[27] Note that despite the first and second round of the survey were also overlapping with our period of interest, we could not use them due to the absence of the relevant questions in the previous questionnaires.

6. Conclusions

The policy and academic debate around the relationship between ODA and migration has almost exclusively been centered around the potential role of foreign assistance as an instrument to manage (and curb) international emigration from developing countries. Yet, from a developing country perspective, international migration accounts for a relatively small share of total population movements, as it is characterized by substantive upfront moving costs. Especially in poor and deprived contexts, internal emigration decisions, namely *whether* and *where to* emigrate - are likely to be more sensitive to the welfare enhancing effects of foreign assistance.

In this paper, we have showed that ODA acts as a *pull factor* for internal migration in Malawi. Our findings show that moving from zero to positive aid inflows leads to 660 more migrants per district, which is about 8% of the average number of migrants per district in 2008. As the relationship between aid disbursements and internal immigration is non-linear, the resulting *pull factor* effect appears to be mostly driven by the presence of aid-supported projects, rather than their size. Conversely, we find no evidence of a correspondent *push factor* effect of foreign assistance. Taken together, these findings appear to be at odds with the *budgetary constraint channel* and the positive role of aid in favoring emigration by enabling a larger share of the population to finance their moving costs.

When investigating the potential channels at work, our analysis reveals that the positive welfare effects of foreign assistance manifest themselves not only through an increase in economic opportunities, but also via improved access to local public services in recipient districts. This result corroborates with previous research on the importance of aid-supported projects in affecting non-monetary dimensions of well-being, particularly in low-income countries.

From a policy point of view this paper highlights a so far unexplored dimension of foreign aid i.e. its capacity to drive within-country migration by affecting the distribution of economic and income opportunities across internal areas. A potential concern is that aid-supported projects, as we show in our analysis, mostly drives internal migration towards easily-targeted urban areas. This poses important challenges in donors' aid allocation decisions. While aid-supported projects in urban-areas might play a role in helping cities to better manage the process of rapid urbanization and alleviate the associated high costs (Henderson and Turner, 2020), they might also favor population growth in already congested cities and magnify the existing rural/urban gaps in income and amenities.

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Appendix A: Variables Description

Table A1: Description of the Main Variables

Domain and Source	Variable Name	Description
Official Development Assistance Data **Sources:** Malawi Aid Management Platform Geocoded Research Release, 2000-2011 OECD-DAC International Development Statistics (Used to build the IV)	**Aid Disbursements$_{j:t-1,t-3}$**	*Log of the 3-year average of total aid disbursements received by the destination district **j** and concluded over the previous 3 years (expressed in constant US$).*
	Number of Aid Projects$_{j:t-1,t-3}$	*Log of the 3-year average of the number of aid projects concluded in the destination district **j** over the previous 3 years.*
	Stock of Aid Disbursements $_{j,t}$	*Log of Cumulated Disbursement of Aid Projects concluded up to time **t** in district **d** (expressed in constant US$)*
	Disbursement for Incomplete Projects$_{j:t-1,t-3}$	*Log of the 3-year average the resources allocated to aid projects in **j**, launched in year **t-3** to **t-1**, but completed after 2008 (expressed in constant US$).*
	Disbursement for Social Projects$_{j:t-1,t-3}$	*Log of the 3-year average of total aid disbursements dedicated to Social-related CRS Sectors, received by the destination district **j** and concluded over the previous 3 years (expressed in constant US$).*
	Disbursement for Economic Projects$_{j:t-1,t-3}$	*Log of the 3-year average of total aid disbursements dedicated to Economic-related CRS Sectors, received by the destination district **j** and concluded over the previous 3 years (expressed in constant US$).*
	Disbursement for Miscellaneus Projects$_{j:t-1,t-3}$	*Log of the 3-year average of total aid disbursements dedicated to non-Social, non-Economic related CRS Sectors (or whose destination is unclear), received by the destination district **j** and concluded over the previous 3 years (expressed in constant US$).*
	Instrument $_{j,t-1}$	*3-year average of the net spending by each international donor operating in district **j** everywhere but in Malawi in the previous 3 years, weighted by the probability of each donor to be involved in district **j** over the period 1998-2008.*
Internal Migration Data **Source:** Minnesota Population Center. Integrated Public Use Microdata Series, International: Version 7.2 [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D020.V7.2	***Network***$_{ij,t-1}$	*Stock of Migrants born in district **i** and living in district **j** as in year **t-1** (in logs).*
	Migrant Flow$_{ij,t}$	*Total number of people that moved from district **i** to district **j** at time **t** (Dependent Variable)*
	Migrant Flow (Men)$_{d,t}$	*Total number of Men that moved from district **i** to district **j** at time **t** (Dependent Variable)*
	Migrant Flow (Women) $_{j,t}$	*Total number of Women that moved from district **i** to district **j** at time **t** (Dependent Variable)*
	Migrant Flow (Youth) $_{j,t}$	*Total number of 0-14 y.o. children that moved from district **i** to district **j** at time **t** (Dependent Variable)*
	Migrant Flow (Work) $_{j,t}$	*Total number of 15-64 y.o. working age migrants that moved from district **i** to district **j** at time **t** (Dependent Variable)*
	Migrant Flow (Old) $_{j,t}$	*Total number of 65+ y.o. elders that moved from district **i** to district **j** at time **t** (Dependent Variable)*
Additional controls: **Sources:** NOAA-DMSP Harari and La Ferrara (RESTAT 2018)	***Nightlights*** $_{j,t}$	*Average Night-stime light Luminescence in district **j***
	Conflict $_{j,t}$	*Presence of any form of conflict in district **j** (dummy)*
	SPEI $_{j,t}$	*Crop affecting environmental variable in destination district **j***

Notes: Subscripts - o indicates the district of origin; d refers to the district of destination (when referring to internal migration); t refers to time. All variables taken from Harari and La Ferrara (2018) were originally available at cell level, and have been processed and rescaled to match the boundaries of each district. In the robustness tests, other definitions of aid have also been used. They are described in the text.

Table A2: Migration Inflows and Stocks by Gender & District of Destination

	1998				2008			
	Women		Men		Women		Men	
District	Flow	Stock	Flow	Stock	Flow	Stock	Flow	Stock
Blantyre City	10210	102060	11830	108100	52080	309540	54690	320140
Lilongwe City	5490	32680	6310	38360	25420	134160	26560	147750
Thyolo	8680	182460	8950	155190	18870	305000	18850	278780
Mulanje	7600	170290	7710	141770	15380	270910	14970	242820
Chikwawa	7600	118380	7430	118650	15070	215910	15180	215100
Blantyre	5490	101180	5340	91900	11100	170670	10740	160360
Balaka	5460	88710	4970	75550	10820	159230	10630	146220
Phalombe	4910	94030	4790	79920	10090	162810	9720	147290
Chiradzulu	4430	93170	4700	76320	8660	150620	7950	134260
Mangochi	2290	22240	2190	20590	8070	56570	8150	55250
Kasungu	2510	25150	2970	27690	7300	65260	7540	69580
Zomba City	1300	10000	1490	10690	7260	39880	7510	41560
Nsanje	3670	65840	4240	64810	7400	117710	7200	115220
Mzuzu	1710	8220	1580	8470	7300	38310	6800	38030
Lilongwe	1020	12260	1070	12900	6050	39380	6630	40350
Mzimba	1400	13100	1330	13610	4330	37690	4680	37890
Mwanza	1200	24100	1450	21600	4340	46090	4440	43690
Machinga	890	9890	1030	9220	3980	27980	4160	27560
Neno	1910	29860	1800	26870	3560	54330	3530	51370
Ntcheu	840	11150	1040	10840	3350	27570	3540	27710
Salima	820	9110	840	9920	3210	24110	3530	26330
Zomba	1130	10830	1070	11590	3470	27350	3120	28550
Mchinji	1080	10940	1160	12510	3270	27150	2980	29440
Dowa	1150	11780	880	11540	3000	29180	3000	27830
NkhataBay-Likoma	620	4530	650	5220	2610	16060	3250	17950
Dedza	660	6420	730	6470	2560	19450	2790	20690
NkhotaKota	820	10110	1010	12230	2360	23560	2470	26860
Karonga	380	4380	350	3900	2280	14710	2180	13440
Rumphi	720	5400	730	5480	2150	16650	2190	16910
Ntchisi	610	5980	550	6090	1730	14470	1630	14520
Chitipa	230	1910	290	1780	830	5780	970	5620

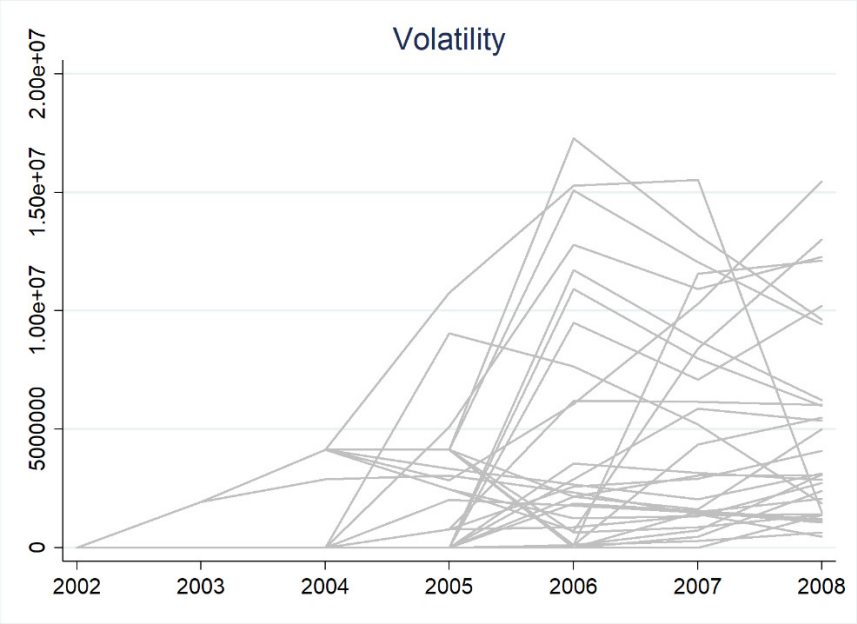
Source: Authors' elaboration based on Malawi 1998 and 2008 Censuses (IPUMS).

Table A3: Migration Flows by Age Groups

Year	Children	Working age	Elderly	Total
1998	105,100	70,160	2,050	177,310
1999	93,770	44,480	1,320	139,570
2000	125,880	70,250	1,750	197,880
2001	129,580	62,220	1,700	193,500
2002	125,750	64,230	1,670	191,650
2003	156,730	91,480	2,200	250,410
2004	174,000	96,750	2,010	272,760
2005	192,710	111,450	1,720	305,880
2006	201,360	125,800	1,840	329,000
2007	204,930	114,470	1,690	321,090
2008	297,130	218,790	3,560	519,480

Notes: Migrants flows distribution by age group and year of migration. Children refers to migrants less than 15 years old. Working age include people between 18 and 64. Elderly includes all migrants aged 65 and more. *Source*: Authors' elaboration based on Malawi 2008 Census (IPUMS).

Figure A1: Volatility of Aid Disbursements by District



Notes: Time series of the yearly volume of concluded aid projects in each district (in constant US$).

Appendix B: Notes on the IV analysis

Two-Step Strategy

As discussed in Section 3, our setting might be subject to omitted variable bias, that might in turn trigger endogeneity issues. In particular, omitted variables would introduce a correlation between concluded aid projects in district *j* at time *t* and the *monadic* component of the error term. We synthetically show this point in the following equation, which is obtained by isolating the destination specific component of the error term ω_{jt} from equation (1):

$$\ln(Mig_{ijt}) = \alpha_{ji} + \alpha_{it} + \beta \ln(Aid\ Disbursements_{j:t-1,t-3}) + (e_{ijt} + \omega_{jt}) \quad \text{(B.1)}$$

Foreign assistance might be endogenous because of the potential omission of unobserved factors correlated both with the size of aid in district *j* and ω_{jt}.[28]

Such potential endogeneity is traditionally addressed by means of an instrumental variable (IV) approach. However, the presence of a monadic endogenous variable in a dyadic setting as in Equation (2) makes the IV approach hardly viable in practice, as the instrument should have an ***ijt*** dimension to qualify. An attractive solution is to implement an instrumental variable (IV) approach using a two-step strategy along the lines of Eaton and Kortum (2002) and Head and Mayer (2014). This strategy reduces the second-step equation to the following:

$$\widehat{\alpha_{jt}} = \beta \ln(Aid\ Disbursements_{j:t-1,t-3}) + \omega_{jt} + \alpha_j + \alpha_t + \epsilon_{jt} \quad \text{(B.2)}$$

where $\widehat{\alpha_{jt}}$ is the estimated destination-year fixed effects, obtained from a first stage structural gravity model:

$$\ln(Mig_{ijt}) = \alpha_{ji} + \alpha_{it} + \alpha_{jt} + e_{ijt} \quad \text{(B.3)}$$

This two-step approach departs from the standard dyadic nature of gravity models as the coefficient of the aid variable in Equation (B.2) indicates how foreign aid volumes affect – on average – overall immigration in a given district. Therefore, with no dyadic terms in the second step, we can now instrument our variable of interest using an IV that only varies by district and time.

[28] While this correlation is likely to be attenuated through the inclusion of pre-determined values of aid with respect to immigration flows, endogeneity concerns still may apply to Equation (B.1) as actual ODA flows at time t can be plausibly considered the expected flows at time t-1.

Construction of the Instrument

The instrument exploits exogenous variation in the supply of aid weighted by each district's probability of receiving aid.

Following Dreher et al. (2019), we define the probability of receiving aid from donor *k* as $\overline{p_{j,k}} = \frac{1}{11}\sum_{t=1}^{11} p_{j,k,t}$ - where $p_{j,k,t}$ is a binary indicator assuming value one when district *j* hosts at least one agreed aid project from donor *k* at time *t*. We multiply this probability by the average net volume of aid disbursed by donor *k* over the previous 3-year spell to all other countries but Malawi. $ODA^{(j)}_{k:t-1,t-3}$. Finally, all donor specific variables are aggregated at district level. The resulting weighted sum is utilized as the IV for aid disbursement in Equation (B2). Such constructed IV is plausibly related to the volume of concluded projects in any district under the commonly adopted assumption that an exogenous shock in the total supply of aid should affect the allocation of foreign assistance in the same direction. Our first stage then becomes:

$$Aid_{j:t-1,t-3} = \gamma_1 \sum_k \left(ODA^{(j)}_{k:t-1,t-3} * p_{j,k} \right) + \alpha_j + \alpha_t + \epsilon_{jt} \qquad \text{(B.4)}$$

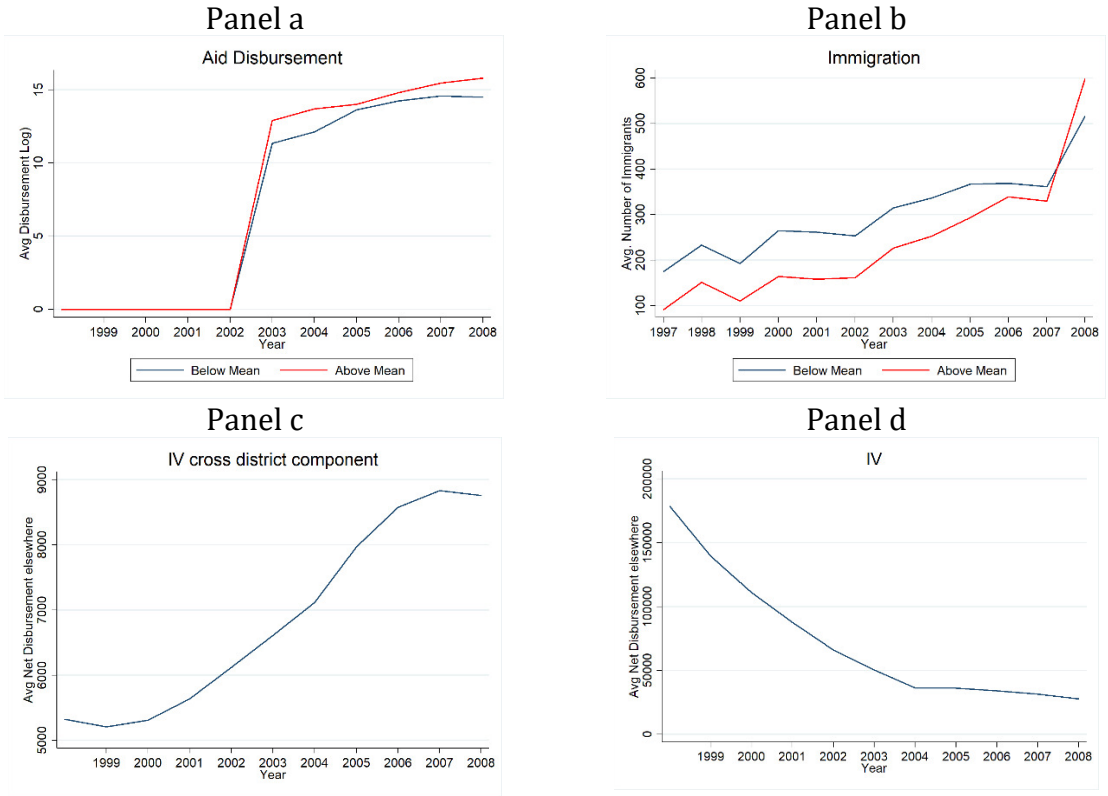
The term γ_1 captures the correlation of our instrument with the endogenous variable. The first stage statistics reported in Table B1 indicates a positive correlation between the IV and our endogenous variable, while the Kleibergen-Paap F-statistic is above the conventional levels, a fact that indicates that our estimate should not be biased by the adoption of a weak instrument. From the conceptual point of view, the exclusion restriction is expected to hold, as the total amount of aid spent by all donors outside of Malawi hardly affect within-country migration patterns. However, it is not possible to formally test for the exogeneity of the instrument through the Hansen-J test given that the model is exactly identified. As a work-around strategy, in order to rule out potential violation of the exclusion restriction in our model we follow Christian and Barrett (2017) and Dreher et al. (2019) and plot the trends displayed by aid flows and migration over time. As Christian and Barrett (2017) pointed out, the condition for such a shift-share instrument to be valid is that the time trend does not dominate yearly variation in the exogenous time series, and that the contemporaneous trends in the outcome are parallel across different levels of exposure to the treatment. Figure B.1 shows that the parallel trends apply both for districts below and above the average probability of receiving aid, which points to the validity of our IV. In conclusion, by combining the first stage statistics with the reduced form results (also reported in Table B1), we can cautiously conclude that the effect of the instrument on the dependent variable runs entirely through the endogenous variable i.e. it appears that there are no direct effects of the instruments on the dependent variable.

Table B1: First Stage Statistics

	(1)	(2)
Model	Reduced Form	1st Stage
Estimator	PPML	PPML
Dep. Variable	*Migration. Flows*	Aid Disbursements $_{j:t-1,t-3}$
Instrument $_{j,t-1}$	**-0.00006*** **	**-0.0006*** **
	(0.000)	**(0.000)**
Observations	10,054	10,054
Destination FEs	Yes	Yes
Year FEs	Yes	Yes
Kleibergen–Paap F stat	-	16.46
Kleibergen–Paap LM stat	-	6.292
Kleibergen–Paap P-Value	-	.012

Notes: The table shows the reduced form and first stage coefficients in column 1 and 2, respectively.

Figure B1: Shift-Share Instrument



Notes: Panel a and b compare the trend of both our variable of interest (log of the 3-years average of concluded disbursements) and the dependent variable (immigration in recipient districts) in districts receiving less than the average aid with respect to those receiving more than the average aid disbursement in a given year t. Panel c and d report the trend over time of the average of the time varying component of our instrument and of the overall instrument respectively.

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