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ARTICLE

The effects of development aid on irregular migration to Europe: Deterrence or attraction?

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Abstract

Motivation: Responding to growing immigration concerns in recent years, European countries have claimed to tackle the root causes of migration using development assistance. Some recent analyses find more aid to be associated with lower immigration, providing support to this policy. But these findings rely on measures of regular migration, while donors' concern is centred on irregular migrants.
Purpose: This study tests whether development aid has a deterrent effect on irregular migration to Europe.
Methods: Adopting innovative data on irregular migration flows to Europe between 2009 and 2016, a simultaneous equations model accounts for the potential endogeneity of both total and bilateral aid.
Findings: The study finds that total aid does not significantly reduce numbers of migrants apprehended at Europe's border. Moreover, bilateral aid tends to raise these numbers. The estimated costs for each deterred irregular migrant are high: in the best-case scenario the range is between USD 150,000 and USD 320,000. The estimated costs to deter regular migrants are even higher, between USD 0.9 million and USD 2.5 million. Both estimates concur with those from previous work. Findings are robust to different aid measures and specifications.
Policy implications: Empirical results provide no evidence to support the use of development aid to deter migration.

KEYWORDS

Deterrence development, development aid, Europe, migration, irregular migrants

1 | INTRODUCTION

Record numbers of refugees and migrants have reached European territories in recent years (Eurostat, 2016; UNHCR, 2017). More than 10,000 lives have been lost attempting to cross the Mediterranean Sea (IOM, n.d.). In response, significant funding has been allocated by European Union (EU) authorities and countries to tackle the root causes of migration and displacement (Latek, 2016). The new

European Agenda on Migration has introduced the use of development assistance to reduce incentives for irregular movements as one of its pillars (European Commission, 2016).

Several studies have previously expressed scepticism regarding the effectiveness of development measures at reducing emigration (Clemens & Postel, 2018; De Haas, 2007). However, recent empirical papers find that more aid to countries of origin is associated with fewer migrants (Gamso & Yuldashev, 2018a, 2018b; Lanati & Thiele, 2018) and fewer asylum seekers (Murat, 2020) to the Organisation for Economic Co-operation and Development (OECD) area.

But this empirical evidence relies on measures of regular migration, while the expressed goal of aid packages is to reduce irregular flows. The only exception is a study that focuses on Italy as a destination (Clist & Restelli, 2020). The present research contributes to this strand of literature by focusing on the number of irregular migrants that crossed Europe's border via all three main entry points: Spain, Italy and Greece. These account for 99.15% of detected illegal entries into Europe since 2009 (Frontex, n.d.). A simultaneous equation model (SEM) controls for potential endogeneity of aid with panel data covering 147 countries of origin between 2009 and 2016.

The main finding is that total aid (from all donors other than the destination country) tends to retrieve a non-significant association, while there is a small positive relationship between bilateral aid and the number of irregular border crossings. Nonetheless, the effect size of this "attraction effect" is small: a 1% increase in bilateral aid is associated with a 0.052% increase in border crossings. The main drivers of irregular migration to Europe include the migrants' network at destination as well as income, population size and the presence of conflict at origin. In addition, irregular migration has a significant influence on the amount of bilateral aid a country of origin receives from the destination country, but it does not affect total aid from other donors.

The remainder of this article is composed as follows: section 2 provides a brief review of the literature on aid and migration; section 3 outlines the empirical approach and describes the data; section 4 and 5 present and discuss the results; section 6 concludes.

2 | LITERATURE REVIEW

Empirical literature has focused on three main transmission channels from aid to migration. First, drawing on neoclassical theories, it has been posited that aid, promoting economic growth in recipient countries, could decrease income differentials with potential destinations (Böhning & Schloeter-Paredes, 1994). By shrinking income differentials between origin and destination, aid can reduce the attractiveness of migration, and therefore decrease the number of immigrants (Borjas, 1989). This seems the theoretical justification to the current use of development assistance to reduce migration.

Second, drawing on theories of the migration transition, a competing framework posits a non-linear relationship between economic development and migration (Skeldon, 1997). This would follow an inverted-U shape pattern, changing direction when per capita income at origin reaches the range USD 6,000 to 8,000 per capita in purchasing power parity (PPP) (Clemens, 2014; Dao et al., 2018). According to this view, more aid at lower levels of income is likely to lead to more migration because it relaxes the budget constraints of potential migrants (Angelucci & De Giorgi, 2009; De Haas, 2007).

Third, drawing on theories of the migrants' network (see Massey, 1990), it has been posited that bilateral aid can reinforce bilateral ties and cause greater migration from an aid recipient to a specific bilateral donor (Berthélemy et al., 2009). For instance, this could happen through personal contacts developed during the implementation of aid projects. Greater bilateral aid corresponds to greater chances to expand the social network of potential migrants. More broadly, a greater presence of a bilateral donor can contribute to make more information available lowering transactional costs for those who want to emigrate (Castles et al., 2014).

Turning to the empirical evidence, Berthélemy et al. (2009) estimated the effects of both bilateral and total aid from 22 OECD donors to 187 migrant-sending recipients in 1991 and 2000. In a cross-section setting, they find a positive impact on immigrant stocks for both bilateral and total aid. A 1% increase in bilateral official development assistance (ODA) is associated with a 0.3% increase in bilateral migrant stocks, while a 1% increase in total ODA is associated with a 0.15% increase. Berthélemy et al. (2009) attempt to correct for the endogeneity of aid using an SEM by modelling a second equation that estimates (bilateral) aid allocation.

A problem that Berthélemy et al. (2009) recognize in their specification is that the chosen dependent variable measures stocks of regular migrants. Hence, they estimate the effect of aid (over five and 10 years) on immigration and emigration decisions that potentially took place over several decades. Moreover, this prevents the authors from including a control for the migrants' network. Because immigrant stocks are positively associated with both aid allocation and migration flows (Bermeo & Leblang, 2015), failing to account for this may introduce an upward bias. Given that aid is found to have a positive effect, it may be that the result is driven by endogeneity because of omitted variables.

Menard and Gary (2018) reproduce the SEM design of Berthélemy et al. (2009) adding a third equation for bilateral trade. They also include a time dimension adopting panel data that cover the same 22 OECD donor countries over the 2000–2010 period. Their results confirm a positive, but much smaller, association between bilateral aid and contemporary migration. A 1% increase in aid flows leads to a 0.182% increase in migration flows. Moreover, it is also much smaller than the contemporary effect of migration flows on aid allocation. A 1% increase in the migration inflow leads to a 0.723% increase in aid flows. Their findings suggest that using flows, instead of stocks, as a dependent variable makes the positive effect of bilateral aid much weaker. Nonetheless, the relationship might still be upwardly biased as the authors do not control for the positive effect of migrant stocks on aid allocation. Furthermore, the authors do not control for the effect of total aid.

The findings of Berthélemy et al. (2009) have been challenged by Lanati and Thiele (2018). Their panel data cover 28 donor countries and 136 recipient countries between 1995 and 2014. Using the standard three-stage least squares (3SLS) estimator, they show that a positive effect of bilateral aid on migration is completely offset by a negative effect of aggregate aid. A 1% increase in total aid per capita is associated with a reduction in emigration rates to OECD destinations of around 0.1%. They also confirm that the migrants' network (as measured by predetermined stocks) has a much stronger positive effect than bilateral aid.

Dreher et al. (2019) focus on the specific case of refugees. Operationally, this can be seen as a subcategory of regular migrants: only those with permits related to asylum or international protection. Relying on panel data from the United Nations High Commissioner for Refugees (UNHCR) for 141 origin countries over the 1976–2013 period, they assess the impact of aid on refugee outflows. The authors account for reverse causality using changes in donor governments' fractionalization as instrumental variable. Their findings suggest that aid has no significant impact on overall refugee flows in the short term; however, it exerts a deterrent effect after an 11-year time period. When considering only flows to OECD destinations, increased aid is associated with more refugees in the short run, whereas a negative association is confirmed in the longer term (i.e., 15 years).

A partial exception to the focus on regular migration is an analysis of the flow of bilateral asylum seekers to several OECD destinations between 1993 and 2013 (Murat, 2020). Using a system generalized method of moments (GMM) estimator, Murat (2020) retrieves a negative association between bilateral aid and asylum applications from countries with gross domestic product (GDP) per capita of less than USD 787 (2005 prices). A 1% increase in bilateral ODA is associated with a 0.05% decrease in the number of asylum applications. There is mixed evidence over a longer time horizon, and for countries with a higher GDP per capita. To the contrary, the author finds no significant effect on regular migration flows.

A potential problem in Murat (2020) is that none of the baseline estimates convincingly passes postestimation tests. Either autoregressive (AR) or Hansen-J-test are always significant, at least at the 10% level, casting doubts on the instruments' validity (see Roodman, 2009, and Arellano & Bond, 1991). Moreover, system-GMM may not account for the joint determination of aid and migration. This concern is compounded by the exclusion of relevant factors, such as conflict and colonial links, that may be a source of endogeneity if omitted. More in general, SEM deals better with the potential endogeneity caused by joint determination of aid and migration allowing cross-equation disturbances to be correlated.

Clist and Restelli (2020) are the only study that focuses on irregular migrants, as measured by border apprehensions. Using Italy as the only destination, they find no significant effects of either bilateral or total aid on the number of migrants apprehended at the border. This is confirmed in both the baseline Fixed Effect estimates and 3SLS robustness check that accounts for the potential endogeneity of both bilateral and total aid.

Thus, with the partial exception of Murat (2020) and Clist and Restelli (2020), all previous studies rely on measurements of regular flows and stocks, whereas the main policy focus is irregular movements. This is not a trivial point. As discussed in section 3.2, regular and irregular flows involve different countries of origin, hence different aid recipients. Inferences on measures of regular migration cannot provide reliable evidence to assess the impact of aid at deterring irregular flows.

This article improves on earlier work by focusing on a measure that more accurately captures the stated aim of donors: reducing flows of irregular migrants. It does so by considering all main irregular routes to Europe, thus overcoming the main limitation of one-destination studies (i.e., Clist & Restelli, 2020). Furthermore, acknowledging the potential endogeneity of both total and bilateral aid, this study provides a more comprehensive set of robustness tests based on 3SLS rather than potentially biased ordinary least squares (OLS) estimates. The article also addresses other limitations by: (a) using flows as dependent variables rather than stocks; (b) controlling for the attraction effect of migrants' network; (c) using aid disbursements rather than commitments; (d) considering both bilateral aid and total aid at the recipient level.

3 | EMPIRICAL APPROACH

3.1 | Model specification and estimation method

This study tests for the effects of aid on irregular migration using panel data of dyadic aid and migration flows. It focuses on three destinations that are the main ports of entry to Europe: Spain, Italy and Greece. The sample includes all countries of origin that are eligible recipients of aid according to the OECD list (OECD-DAC, n.d.).[1] Countries that are members of the OECD-DAC committee are also excluded. The resulting dataset covers immigration to Greece, Italy and Spain from 147 origin countries over the 2009–2016 period.

The modelling framework is based on a gravity equation similar to that proposed by Vogler and Rotte (2000) but addressing explicitly the statistical problems of endogenous allocation of aid in

[1]The DAC List of ODA recipients shows all countries and territories eligible to receive ODA. These consist of all low- and middle-income countries based on gross national income (GNI) per capita as published by the World Bank. The list also includes all Least Developed Countries (LDCs) as defined by the United Nations (UN) (OECD-DAC, n.d.).

origin-destination pairs. There are two main sources of concern in this regard: (a) reverse causality; and (b) joint determination of aid and migration.

Reverse causality has to do with the fact that donors can use development aid as a tool to respond to immigration pressure (Bermeo & Leblang, 2015; Czaika & Mayer, 2011). Destination countries may disburse more aid to recipients that migrants originate from, or they might reduce assistance to punish the lack of co-operation at controlling outflows. Using predetermined values of aid mitigates endogeneity concerns, but will not fully address reverse causality in the presence of persistence of migration (Clemens & Postel, 2018).

A second potential source of endogeneity is linked to the *joint determination* of aid and migration. Conditions at origin, such as a recent conflict or a natural disaster, are factors that simultaneously make a country more likely to receive aid (see, for instance, Neumayer, 2003) and make its citizens more likely to emigrate (see, for instance, Mayda, 2010). If this is not accounted for, it could lead to a spurious link between total migration and aggregate aid because they are simultaneously affected by such factors. There are also specific bilateral ties, such as the migrants' network from a given country, that could influence both bilateral migration and bilateral aid from that specific destination country (Bermeo & Leblang, 2015). Further, it is possible that aid and migration have common explanatory variables that are unobserved (Berthélemy et al., 2009). In econometric terms, this means that cross-equation disturbances may be correlated.

To address both reverse causality and joint determination of aid and migration, this study follows Berthélemy et al. (2009) employing a similar SEM. This allows making endogeneity explicit by treating both aid and migration as dependent variables in separate equations that include their joint determinants as explanatory variables.

The empirical model follows Clist and Restelli (2020) in including both bilateral and total aid variables as separate equations. While most other literature recognizes the endogeneity of bilateral aid, this is not the case for total aid (see Berthélemy et al., 2009; Lanati & Thiele, 2018; Murat, 2020). However, there is no reason to think that aid from other donors will be "less" endogenous than bilateral aid. This would mean assuming that only aid allocations from Spain, Italy and Greece react to irregular migration flows to Europe. Other European countries and institutions are likely to consider the number of migrants reaching the EU's southern border when allocating aid. Hence, the model specifies structural equations for all endogenous variables (Cameron & Trivedi, 2010).

To the already discussed reverse causality and joint determination, an additional source of concern is related to *multilateral resistance* (Bertoli & Fernández-Huertas Moraga, 2013). Considering only dyadic variables ignores what happens in alternative destinations and the confounding influence that their attractiveness exerts on bilateral migration (Hanson, 2010). This can lead to biased results that overestimate the effect of GDP at origin and underestimate that of migration policies (Bertoli & Fernández-Huertas Moraga, 2013). However, in the context of international trade and migration, Parsons (2012) has shown that using origin and time fixed effects accounts for (most of) multilateral resistance in dyadic analysis. As a robustness check, the model is expanded to additionally test for multilateral resistance.

The resulting benchmark system is composed of the three equations below, and it includes separate equations for bilateral aid by a specific destination and total aid from all other donors. Following Neumayer (2003) and related literature, a parsimonious set of controls is used for aid allocation equations:

$$MIG_{ijt} = \beta_1 BilatODA_{ijt} + \beta_2 OtherODA_{it} + \beta_3 Stock_{ij} + \beta_4 GDPcapita_{it} + \beta_5 Unemploy_{it} + \beta_6 Youth_{it} + \beta_7 Pop_{it} + \beta_8 PolFreedom_{it} + \beta_9 Conflict_{it} + \beta 10 NatDis_{it} + \beta 11 Policy_{ijt} + \beta 12 GDPcapita_{jt} + \mu_{ijt} + \varepsilon_{ijt}$$

$$BilatODA_{jit} = \gamma_1 MIG_{ijt} + \gamma_2 GDPcapita_{it} + \gamma_3 Pop_{it} + \gamma_4 PolFreedom_{it} + \gamma_5 Conflict_{it} + \gamma_6 NatDis_{it} + \gamma_7 Colony_{ij} + \gamma_8 BilatExports_{jit} + \mu'_{ijt} + \varepsilon_{jit}$$

$$OtherODA_{it} = \delta_1 MIG_{ijt} + \delta_2 GDPcapita_{it} + \delta_3 Pop_{it} + \delta_4 PolFreedom_{it} + \delta_5 Conflict_{it} + \delta_6 NatDis_{it} + \delta_7 TradeOpen_{it} + \mu''_{ijt} + \varepsilon_{jit}$$

Where subscripts i and j denote country of origin and destination respectively; μ, μ' and μ'' are sets of origin, destination and year fixed effects.

In line with Berthélemy et al. (2009) and Lanati and Thiele (2018), 3SLS are used to estimate the system. 3SLS can be thought of as producing estimates from a three-step process (Zellner & Theil, 1962). First, it creates instrumented values for all endogenous variables: migration flows, bilateral ODA and total ODA. These instrumented values can be considered as the predicted values resulting from a regression of each endogenous variable on all exogenous variables in the system. Such variables are exogenous in the sense that they are not identified within the system (Greene, 2003). The second step is to obtain a consistent estimate for the covariance matrix of the equation disturbances. These estimates are based on the residuals from a two-stage least squares estimator (2SLS) estimation of each structural equation. Third, it performs a generalized least squares (GLS)-type estimation using the covariance matrix estimated in the second stage and with the instrumented values in place of the right-hand-side endogenous variables.

To identify the system there must be sufficient information to determine the parameters given the specified functional form (Greene, 2003). This information is secured by rank and order conditions (Cameron & Trivedi, 2010). In practical terms, this means there should be at least as many non-collinear exogenous variables in the remaining system as there are endogenous right-hand-side variables in the given equation; this condition must hold for every structural equation (Wooldridge, 2010).

Two strategies are usually adopted to achieve identification (Tavares & Wacziarg, 2001). First, estimating a system based on prior theoretical exclusions restrictions, which comprises the benchmark model and ensures that (at least one of the) equations are overidentified. Second, as a robustness check, the sensitivity of the model is tested through an empirical specification search, where data determine the variables that should be included in each equation.

3.2 | Dependent variable

The main innovation in this article is the use of a dependent variable that measures flows of irregular migrants. This is the yearly number of migrants apprehended while illegally crossing the southern segment of Europe's external border. Data come from the European Border and Coast Guard Agency (Frontex) and are available from 2009 (see Frontex, n.d.).

Contrary to measures commonly used in literature, such as the number of residence or work permits, it captures figures of much greater interest to European donors. The measure is based on flows rather than stocks, hence it is not affected by emigration. Moreover, focusing on new entries, the measure is not affected by demographic (e.g., new births) or status changes (e.g., negative outcome of asylum applications) that affect the stocks of irregular migrants.

Figure 1 shows that, according to most recent data, regular and irregular inflows followed different patterns both within and between destination countries. In Italy irregular migrants have reached almost 50% of aggregate immigration between 2014 and 2016, and in Greece irregular inflows have always been greater than regular entries after 2009. To the contrary, in Spain irregular inflows never reached 10% of overall immigration figures. Furthermore, within Italy regular entries decreased between 2010 and 2016 whereas irregular inflows followed a growing trend peaking at 200,000-unit in 2016. It stems clearly from these empirical observations that generalizing results based solely on measures of regular flows is problematic.

3.3 | Main independent variables

The main independent variable is the bilateral yearly aid disbursed from 2009 to 2016. Bilateral gross disbursements, as reported by the OECD's Creditor Reporting System (CRS), have been used to operationalize aid. In-donor refugee costs are excluded as they are not spent in recipient countries, although they are largely reported as ODA (OECD, 2017a).

A second independent variable is the total amount of aid received by origin countries from all other donors. To avoid double counting, the bilateral amount disbursed by the relevant destination country has been subtracted.

3.4 | Control variables

Following relevant literature, several control variables have been included to investigate the partial effect of development aid on migration. First, the number of immigrants from that country of origin that already reside at destination accounts for the migrants' network. A second set of variables covers the influence of economic circumstances at origin: GDP per capita and unemployment rate. Third, the model controls for economic conditions at destination by including the GDP per capita in Spain, Italy and Greece. Fourth, population size and the share of young population in the country of origin account for demographic factors. Fifth, the political environment at origin is accounted for by Freedom House's *Freedom in the world* index. This is a compiled index that measures both political rights and civil liberties on a one-to-seven scale, with 1 representing the highest degree of freedom (Freedom House, 2018). Sixth, to account for bilateral immigration policies, data from the DEMIG project have been used to construct an index recording bilateral yearly changes in policy restrictiveness (De Haas et al., 2014). Each piece of legislation has been coded as "more restrictive" (+1), "less restrictive" (-1) or "no changes" (0). The yearly sum gives a cumulative index for immigration policy changes. Because the DEMIG project only covers until 2013, additional information was collected from OECD International Migration Outlooks (OECD, 2015, 2016, 2017b). Seventh, to control for natural disasters, the Emergency Events Database (EM-DAT) provides a list of deadly natural events in given years (Guha-Sapir, n.d.). The presence of conflict is controlled by using data from the UCDP/PRIO Armed Conflict Dataset recording all episodes of armed conflict where at least one party is the government of a state (Gleditsch et al., 2002). Eighth, bilateral distances are measured in geographical, historical and linguistic terms. The common language variable captures the probability that a migrant from a given country speaks a language that is understood by a randomly chosen person at destination (Melitz & Toubal, 2014). To account for shared history and colonial linkages, a dummy variable expands previous measures of colonial legacy recording also whether origin countries have been under temporary military occupation.

The total ODA equation includes a control for a country of origin's openness to trade as a share of GDP. In addition, the bilateral ODA equation controls for donor's self-interest. This is proxied by the share of a donor's exports that goes to a specific recipient country. All variables and related sources are described in Table A1 in the Appendix.

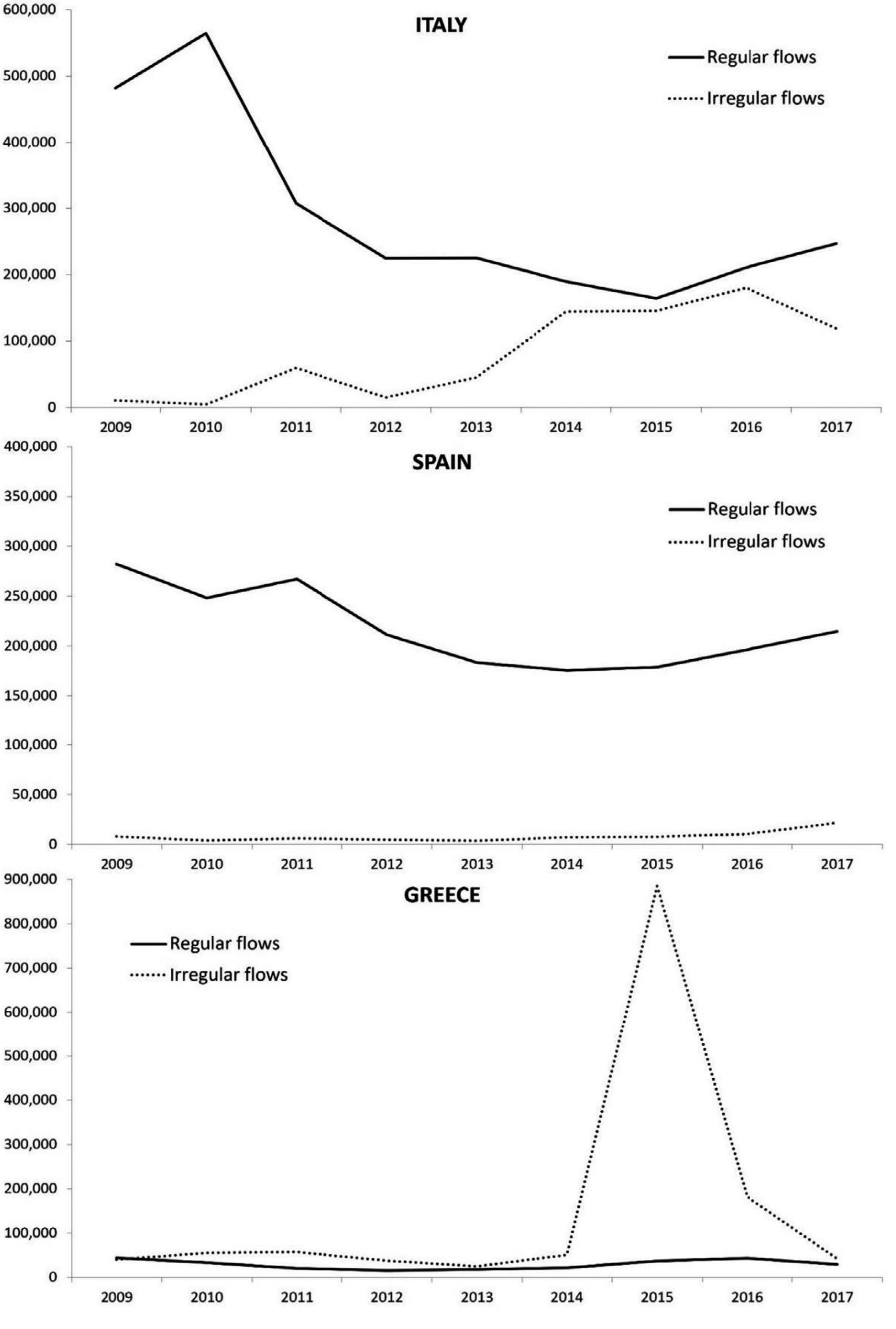

FIGURE 1 Migrant flows to Italy, Spain and Greece 2009–2017
Sources: Frontex (n.d.) for irregular flows; Eurostat (n.d.) for regular flows.

3.5 | Descriptive statistics

Table 1 provides descriptive statistics for all variables described above.

4 | RESULTS

Baseline results are reported in Table 2 comparing the chosen dependent variable—number of irregular migrants apprehended at the border, *Ln(Border)*—with the number of entry permits issued during the same year, *Ln (Regular)*. The latter is the standard variable used in literature to measure (regular) migration flows. It is therefore a useful comparison to assess to what extent results for Spain, Italy and Greece as destination countries may differ from previous studies focusing on a broader sample of destinations.

Looking at the main variable of interest, development aid, small coefficient estimates are found on both measures. The number of illegal border crossings in a given year is significantly associated with bilateral aid disbursements at the 1% level. Increasing bilateral assistance by 1% is associated with a 0.052% increase in the number of irregular arrivals. The total amount of aid received from all other donors does not yield significant effects, although it retrieves a similar-sized coefficient with negative sign (-0.060).

The positive effect of bilateral ODA is confirmed also by estimates on regular migration flows. In line with previous literature, there is a positive significant association between bilateral aid and the number of issued legal permits (Berthélemy et al., 2009; Menard & Gary, 2018). Also in line with

TABLE 1 Descriptive statistics

	Obs.	Mean	Sd	Min	Max
Ln(Border)	3822	1.36	2.30	0.00	13.12
Ln(Bilat ODA)	3773	8.65	6.54	0.00	21.47
Ln(Other ODA)	3773	18.30	4.82	0.00	22.91
Ln(Immigrant Stock)	3605	5.55	3.38	0.00	13.59
Ln(Pop Origin)	3563	15.59	2.21	9.20	21.04
Youth (%)	3387	53.98	6.05	32.21	73.31
Unemployment Origin	3282	8.00	6.21	0.16	34.38
Ln(GDPpc Origin)	3462	7.97	1.16	5.38	11.40
Ln(GDPpc Destination)	3822	10.29	0.16	10.01	10.49
Political Freedom Origin	3599	7.84	3.67	2.00	14.00
Bilat. policy restrict.	3822	−3.40	13.75	−19.00	21.00
Conflict Origin	3822	0.17	0.38	0.00	1.00
Nat. Disaster Origin	3822	1.70	3.63	0.00	43.00
Ln(Dist)	3822	8.61	0.75	6.19	9.81
Colony	3822	0.05	0.22	0.00	1.00
Language	3822	0.12	0.20	0.00	0.99
Trade Openness (GDP%)	3314	84.32	43.77	0.17	442.62
Donors' bilat. exports (%)	3571	0.00	0.01	0.00	0.12

TABLE 2 Baseline estimates

	Ln (Border)			Ln (Regular)		
	Ln (Border)	Ln (Bilat ODA)	Ln (Other ODA)	Ln (Regular)	Ln (Bilat ODA)	Ln (Other ODA)
Ln(Bilat ODA)	0.052***			0.020**		
	(0.012)			(0.0092)		
Ln(Other ODA)	−0.060	−0.11		−0.095**	−0.17	
	(0.091)	(0.19)		(0.037)	(0.17)	
Ln(Immigrant Stock)	0.22***			0.68***		
	(0.026)			(0.013)		
Ln(Pop Origin)	3.87***	−7.54***	−2.17**	0.98***	1.22	−1.44***
	(0.89)	(2.20)	(0.86)	(0.23)	(1.05)	(0.47)
Youth (%)	0.049***			−0.0063		
	(0.018)			(0.0064)		
Unemployment Origin	−0.026			0.046***		
	(0.028)			(0.0067)		
Ln(GDPpc Origin)	−1.15***	0.31	0.52*	−0.46***	−0.99**	0.73***
	(0.29)	(0.72)	(0.27)	(0.10)	(0.50)	(0.22)
Ln(GDPpc Destination)	2.96***			2.64***		
	(0.81)			(0.65)		
Political Freedom Origin	0.033	−0.094	−0.040	0.019	−0.10*	−0.086***
	(0.035)	(0.087)	(0.028)	(0.012)	(0.058)	(0.025)
Bilat. policy restrict.	−0.094***			0.046***		
	(0.015)			(0.0044)		
Conflict Origin	0.30**	−0.28	0.12	−0.010	−0.19	0.13
	(0.12)	(0.29)	(0.095)	(0.044)	(0.21)	(0.089)
Nat. Disaster Origin	−0.0050	−0.0038	−0.00047	−0.0040	0.022	−0.013
	(0.016)	(0.040)	(0.013)	(0.0060)	(0.029)	(0.012)
Ln(Dist)	−1.54***			−0.17**		
	(0.15)			(0.075)		
Colony	1.08***	3.36***		0.21*	2.31***	
	(0.25)	(0.34)		(0.12)	(0.31)	
Language	−2.19***			0.70***		
	(0.30)			(0.14)		
Ln(Border)		0.72***	0.12			
		(0.055)	(0.11)			
Ln(Regular)					0.36***	0.30***
					(0.069)	(0.098)
Donors' bilat. exports (%)		36.2**			22.6	
		(15.6)			(30.0)	

(Continues)

TABLE 2 (Continued)

	Ln (Border)			Ln (Regular)		
	Ln (Border)	Ln (Bilat ODA)	Ln (Other ODA)	Ln (Regular)	Ln (Bilat ODA)	Ln (Other ODA)
Trade Openness (GDP%)			−0.00021 (0.0023)			−0.0013 (0.0014)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2960			3392		
*R*2	0.70	0.69	0.95	0.95	0.74	0.88

Standard errors in parentheses. The model includes the intercept. *p<0.10, **p<0.05, ***p<0.010.

previous studies, total aid is found with a negative coefficient (Lanati & Thiele, 2018). While both parameters are significant at the 5% level, the effects are still small: a 1% raise in aid from all other donors is associated with a 0.095% decrease in the number of regular migrants, while a similar increase in bilateral ODA would lead to a 0.02% growth. Because bilateral disbursements from Greece or Italy or Spain to any recipient country are lower than total ODA from other donors, any positive bilateral effect would be outweighed by the negative effect, leading to an overall deterrent impact of aid on regular migration flows to southern European countries.

Other control variables are found to play a more important role in determining irregular migration flows to Europe. Previous immigration has a positive association, and is statistically significant at the 1% level. A 1% increase in the number of immigrants already residing at destination is associated with a 0.22% growth in border apprehensions. Population size at origin has the largest coefficient: a 1% increase in population size at home is associated with a 3.87% growth in apprehended migrants. In addition, increasing the share of youth by one percentage point is associated with an average 0.049% increase in the number of migrants illegally crossing Europe's borders.

Turning to economic factors, per capita GDP in the country of origin shows a significant negative association. A 1% increase in income at home is associated with a more than equal (1.15%) reduction in border apprehensions. The effect is slightly smaller (0.46%) for regular migrants. In addition, per capita GDP at destination shows a significant positive association with both measures of migration flows. A 1% rise in income at destination contributes to a 2.95% increase in the number of individuals trying to illegally cross its border. These results combined suggest that, while income differentials are a relevant determinant of irregular migration to Europe, budget constraints may not be as relevant as previously thought in literature. Increasing income at origin does not yield a positive effect on irregular migration by loosening financial constraints. Results from a robustness check in Table 4 confirm that the effect of increasing income at home holds negative at different levels of economic development in the country of origin.

Political conditions at destination also matter; restrictive bilateral immigration policy is found to be significantly correlated with irregular migration flows at the 1% level. The result can be interpreted as one additional restrictive legislative measure passed by governments in the destination country leading to a 9.4% reduction in the number of apprehensions at the border.

This negative effect of restrictive immigration laws implies that tougher laws increase the cost of migration meaning fewer migrants manage to reach Europe. At the same time, the positive effect on regular flows suggests that more restrictive policies are associated with more regular migrants. A possible explanation is that legal permits include those for asylum and international protection. These have increased importance in recent years becoming the second motivation for issuing visas after family reunification (OECD, 2017b). Hence, it could be that more restrictive legislation reduces the number of irregular migrants reaching Europe, but it does not deter those seeking asylum and humanitarian protection.

While political conditions at origin are not found to be significant, the presence of violent conflicts positively affects the number of irregular migrants to Europe. To the contrary, natural disasters are not significantly linked to irregular migration flows to Europe. Looking at the determinants of bilateral ODA and total ODA in other structural equations, concerns regarding the endogeneity of total aid find empirical support only for the case of regular migration. 3SLS estimates show that border apprehensions are significantly associated with bilateral aid.

While still positive, the coefficient on total aid from all other donors does not reach standard levels of significance. To the contrary, both bilateral and total disbursements are significantly affected by the number of regular migrants. Colonial links and commercial interests are also relevant determinants of bilateral aid allocation.

4.1 | Robustness checks

The robustness of these baseline results has been checked against a series of additional tests. First, following Tavares and Wacziarg (2001) the model has been submitted to an empirical specification search. Second, the sample of countries of origin has been split into higher and lower incomes. This accounts for the potential non-linear effect of aid on migration depending on the level of economic development of the country of origin. Third, an additional test further controls for multilateral resistance, beyond the strategy of using year and origin fixed effects (see Parsons, 2012). The benchmark model has also been expanded by introducing additional controls to account for other international transfers that might affect migration. Fourth, given that the impact of governance variables on migration may be heterogenous, alternative specifications adopt different measures of governance quality in countries of origin. Fifth, aid is measured in different ways as results may be sensitive to this choice.

4.1.1 | Sensitivity analysis to empirical specification search

The benchmark model draws its specification on literature on migration that provides theoretical and empirical justification for the inclusion of variables on the right-hand side. The sensitivity of results to these choices has been tested undertaking an empirical specification search to let the data determine what restrictions to apply (Tavares & Wacziarg, 2001). In a first step, the system is re-estimated including all contemporaneous variables on the right-hand side. Second, all coefficients that are not significantly different from zero at the 90% confidence level are excluded from the specifications, except for the main variables of interest: bilateral aid and total aid.

The first and the third columns of Table 3 show benchmark 3SLS estimates of the migration equation, for measures of both irregular, *Ln(Border)*, and regular migration, *Ln (Regular)*. Estimates for the second step of the empirical specification search are shown in the second and fourth columns of Table 3. Remaining structural equations from the empirical specification search are reported in Table A2 in the Appendix.

TABLE 3 Sensitivity to empirical specification search

Specification	Ln (Border) Baseline Estimates	Ln (Border) Empirical Specification	Ln (Regular) Baseline Estimates	Ln (Regular) Empirical Specification
Ln(Bilat ODA)	0.052***	0.046***	0.020**	0.014
	(0.012)	(0.012)	(0.0092)	(0.0095)
Ln(Other ODA)	−0.060	0.012	−0.095**	−0.12***
	(0.091)	(0.064)	(0.037)	(0.027)
Ln(Immigrant Stock)	0.22***	0.20***	0.68***	0.67***
	(0.026)	(0.024)	(0.013)	(0.013)
Ln(Pop Origin)	3.87***	4.05***	0.98***	0.97***
	(0.89)	(0.83)	(0.23)	(0.22)
Youth (%)	0.049***	0.047***	−0.0063	
	(0.018)	(0.017)	(0.0064)	
Unemployment Origin	−0.026		0.046***	0.033***
	(0.028)		(0.0067)	(0.0064)
Ln(GDPpc Origin)	−1.15***	−1.16***	−0.46***	−0.45***
	(0.29)	(0.27)	(0.10)	(0.10)
Ln(GDPpc Destination)	2.96***	2.82***	2.64***	2.37***
	(0.81)	(0.76)	(0.65)	(0.66)
Political Freedom Origin	0.033		0.019	
	(0.035)		(0.012)	
Bilat. policy restrict.	−0.094***	−0.088***	0.046***	0.046***
	(0.015)	(0.015)	(0.0044)	(0.0045)
Conflict Origin	0.30**	0.29***	−0.010	
	(0.12)	(0.11)	(0.044)	
Nat. Disaster Origin	−0.0050		−0.0040	
	(0.016)		(0.0060)	
Ln(Dist)	−1.54***	−1.60***	−0.17**	−0.16**
	(0.15)	(0.14)	(0.075)	(0.076)
Colony	1.08***	0.95***	0.21*	0.22*
	(0.25)	(0.22)	(0.12)	(0.12)
Language	−2.19***	−1.99***	0.70***	0.73***
	(0.30)	(0.27)	(0.14)	(0.14)
Year FE	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Observations	2960	3175	3392	3525
*R*2	0.70	0.71	0.95	0.95

Standard errors in parentheses. The model includes the intercept. *p<0.10, **p<0.05, ***p<0.010.

The positive association of bilateral aid with border apprehensions is confirmed as significant at the 1% level. As per regular migration, while both coefficients on aid variables are confirmed in sign and size, only the negative effect of total ODA reaches statistical significance.

4.1.2 | Robustness check: income levels

Increases in income at home are expected to have a positive effect on emigration until GDP per capita reaches around USD 8,000 (at PPP). The effect should then turn negative beyond this threshold (Clemens, 2014; Dao et al., 2018). Baseline results are therefore tested on two sub-samples below and above this cut off point. A low-income sample includes only countries that have a per capita GDP up to USD 8,000 (PPP). A high-income sample includes all remaining observations related to countries of origin with per capita GDP above USD 8,000 (PPP).

Table 4 shows results from 3SLS estimates for the number of apprehensions at the border, *Ln(Border)*. The lower-income sample is presented on the left-hand side, with results for higher-income countries given on the right-hand side. The main difference is that the positive coefficient on bilateral ODA changes sign and turns negative when only richer countries of origin are considered. This suggests that the “attraction effect” of bilateral aid from Spain, Italy and Greece may turn into “deterrence effect” depending on income at origin, as suggested by the migration hump theory. The effect of total aid remains non-significant in both sub-samples.

Nonetheless, the effect of per capita GDP at origin is found to be negative and significant for both lower-income and higher-income countries. Increasing incomes at home corresponds to lower irregular migration from countries both above and below USD 8,000 (PPP). The difference with regular flows can be clearly seen in Figure 2 that plots (log) immigration flows on (log) GDP per capita for both regular and irregular migrants. Despite the limited timeframe, the inverted-U shape pattern can be clearly seen in the case of regular migration. This is not the case for irregular flows.

4.1.3 | Robustness check: Multilateral resistance to migration and other international transfers

A third set of robustness tests expands the model, including additional controls into the migration equation. First, an additional variable accounts for multilateral resistance to migration. The additional

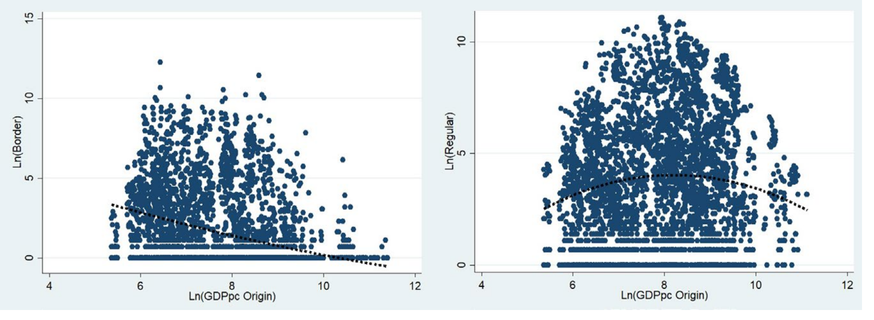

FIGURE 2 Irregular and regular migrant flows at different levels of income, 2009–2016
Sources: Frontex (n.d.) for irregular flows; OECD-MIG (n.d.) for regular flows.

TABLE 4 Robustness check: Income levels

Sub-sample	LOW Ln(Border)	LOW Ln(Bilat ODA)	LOW Ln(Other ODA)	HIGH Ln(Border)	HIGH Ln(Bilat ODA)	HIGH Ln(Other ODA)
Ln(Bilat ODA)	0.11***			−0.097***		
	(0.019)			(0.016)		
Ln(Other ODA)	−0.41	0.86		0.031	0.47***	
	(1.18)	(1.69)		(0.071)	(0.16)	
Ln(Immigrant Stock)	0.15***			0.24***		
	(0.039)			(0.031)		
Ln(Pop Origin)	8.13***	−22.7***	−0.81**	1.71*	7.23***	−6.93**
	(1.89)	(4.25)	(0.38)	(0.98)	(2.77)	(3.10)
Youth (%)	0.014			−0.0036		
	(0.055)			(0.020)		
Unemployment Origin	−0.020			−0.063*		
	(0.047)			(0.033)		
Ln(GDPpc Origin)	−1.26**	0.23	−0.27***	−1.70***	−0.71	4.78
	(0.56)	(1.01)	(0.086)	(0.46)	(1.32)	(3.22)
Ln(GDPpc Destination)	5.07***			0.80		
	(1.19)			(0.89)		
Political Freedom Origin	0.045	−0.058	−0.041***	−0.024	−0.033	−0.013
	(0.079)	(0.14)	(0.011)	(0.047)	(0.13)	(0.11)
Bilat. policy restrict.	−0.14***			−0.036**		
	(0.022)			(0.018)		
Conflict Origin	0.30*	−0.32	0.024	0.18	−0.51	0.076
	(0.16)	(0.37)	(0.032)	(0.17)	(0.46)	(0.51)
Nat. Disaster Origin	−0.0088	0.015	−0.0016	−0.0042	−0.030	0.0064
	(0.025)	(0.056)	(0.0048)	(0.019)	(0.053)	(0.046)
Ln(Dist)	−2.47***			−1.08***		
	(0.29)			(0.16)		
Colony	−0.077	4.51***		2.06***	4.41***	
	(0.51)	(0.58)		(0.24)	(0.41)	
Language	−1.52**			−2.22***		
	(0.62)			(0.29)		
Ln(Border)		0.92***	−0.016		−0.14	2.11
		(0.067)	(0.027)		(0.086)	(1.78)

(Continues)

TABLE 4 (Continued)

Sub-sample	LOW Ln(Border)	Ln(Bilat ODA)	Ln(Other ODA)	HIGH Ln(Border)	Ln(Bilat ODA)	Ln(Other ODA)
Donors' bilat. exports (%)		105.3			17.6	
		(65.4)			(15.5)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1632			1328		
*R*2	0.68	0.67	0.94	0.73	0.77	0.88

LOW: income level below 8,000 USD(PPP); HIGH: income level equal or above 8,000 USD(PPP). *p<0.10, **p<0.05, ***p<0.010.

control captures the number of migrants detected at any other ports of entry to Europe from a given country during the same year. The assumption is that if migration flows to Spain, Italy or Greece decrease because of changes in their relative attractiveness as destinations, we should observe an increase in flows to alternative destinations.

3SLS estimates for *Ln(Border)* are shown in Table 5. All system equations are given in the same table. The variables of interest remain largely unchanged. Bilateral ODA coefficient on border apprehensions is found positive and significant while total ODA is not significant. As a further confirmation that multilateral resistance to migration was largely accounted for in the benchmark model, the coefficients of income at home and immigration policies are found substantially unaffected.

The additional control variable, capturing flows to alternative destinations, has a negative association with border apprehensions. This suggests that movements on irregular routes to Europe are complementary: when flows on one specific route increase, movements on alternative routes tend to decrease, although less than proportionally. This is probably because, as discussed in section 3.2, there are only three main points of entry to Europe: Spain, Italy and Greece. Therefore, decreases on one irregular route will be (partly) offset by increases on other routes.

Given the focus of this study on the effects of ODA on irregular migration flows, an additional robustness test takes into consideration other international transfers strictly linked to development. Both foreign direct investments and total remittances received by the countries of origin are added to the migration equation as a share of recipient's GDP.

The right-hand side of Table 5 shows results for 3SLS estimates. All system equations are given in the same table. The positive coefficient of bilateral aid on border apprehensions is confirmed significant at the 1% level. Similarly, total aid is found with a negative coefficient that does not reach standard significance level. Remittances retrieve a positive association with irregular migration. To the contrary, foreign direct investments exert a negative but not significant effect.

4.1.4 | Robustness check: Alternative measures of governance quality

As a further robustness test, political conditions in the countries of origin are accounted for by alternative measures to Freedom House's index for political freedom and civil liberties. First, the variable is replaced by the similar *Voice and Accountability* indicator from the World Governance Indicators

TABLE 5 Robustness check: Multilateral resistance and international transfers

	(1) MRM			(2) International Transfers		
	Ln(Border)	Ln(Bilat ODA)	Ln(Other ODA)	Ln(Border)	Ln(Bilat ODA)	Ln(Other ODA)
Ln(Bilat ODA)	0.058***			0.036***		
	(0.012)			(0.013)		
Ln(Other ODA)	0.023	−0.14		−0.029	−0.092	
	(0.090)	(0.19)		(0.090)	(0.19)	
Ln(Immigrant Stock)	0.21***			0.21***		
	(0.026)			(0.027)		
Ln(Pop Origin)	4.74***	−7.61***	−2.34***	4.22***	−7.45***	−2.02**
	(0.89)	(2.20)	(0.86)	(0.93)	(2.33)	(0.94)
Youth (%)	0.059***			0.047**		
	(0.018)			(0.019)		
Unemployment Origin	−0.025			−0.034		
	(0.027)			(0.028)		
Ln(GDPpc Origin)	−1.41***	0.34	0.57**	−0.70*	0.54	1.17***
	(0.28)	(0.72)	(0.27)	(0.38)	(0.86)	(0.30)
Ln(GDPpc Destination)	2.60***			2.79***		
	(0.80)			(0.83)		
Political Freedom Origin	0.041	−0.095	−0.041	0.038	−0.12	−0.043
	(0.035)	(0.087)	(0.028)	(0.037)	(0.093)	(0.031)
Bilat. policy restrict.	−0.082***			−0.099***		
	(0.015)			(0.016)		
Conflict Origin	0.32***	−0.28	0.11	0.35***	−0.17	0.097
	(0.12)	(0.29)	(0.095)	(0.13)	(0.32)	(0.11)
Nat. Disaster Origin	−0.0060	−0.0038	−0.00015	−0.0064	0.0021	0.0012
	(0.016)	(0.040)	(0.013)	(0.016)	(0.040)	(0.013)
Ln(Dist)	−1.65***			−1.62***		
	(0.15)			(0.15)		
Colony	0.94***	3.35***		0.93***	3.43***	
	(0.25)	(0.34)		(0.29)	(0.37)	
Language	−2.00***			−1.96***		
	(0.29)			(0.33)		

(Continues)

TABLE 5 (Continued)

	(1) MRM			(2) International Transfers		
	Ln(Border)	**Ln(Bilat ODA)**	**Ln(Other ODA)**	**Ln(Border)**	**Ln(Bilat ODA)**	**Ln(Other ODA)**
Ln(Border) TOT	−0.15*** (0.020)					
FDI (GDP%)				−0.0017 (0.0037)		
Remittances (GDP%)				0.037*** (0.014)		
Ln(Border)		0.72***	0.16		0.67***	0.20*
		(0.055)	(0.11)		(0.057)	(0.11)
Donors' bilat. exports (%)		35.8**			28.8*	
		(15.6)			(16.1)	
Trade Openness (GDP%)			−0.00014			−0.0012
			(0.0023)			(0.0025)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2960			2754		
*R*2	0.71	0.69	0.95	0.71	0.69	0.93

Standard errors in parentheses. The model includes the intercept. *p<0.10, **p<0.05, ***p<0.01.

(WGI). Second, all six dimensions of governance are included: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption (see Kaufmann et al., 2010 for a discussion).

As shown in Table 6, the coefficients on aid variables are almost identical to baseline estimates. The newly added variables retrieve non-significant effects on irregular migration. Both Voice and Accountability and Governance Effectiveness are found with a significant (at 10%) positive association with total ODA, while Rule of Law retrieves a negative coefficient on bilateral ODA (also at the 10%).

4.1.5 | Robustness check: Alternative measures of aid

As a last robustness check, aid is measured in two alternative ways. Thus far, following most literature (Berthélemy et al., 2009; Clist & Restelli, 2020; Menard & Gary, 2018; Murat, 2020) aid has been measured as gross ODA disbursement. However, it could be argued that it is not the total amount of ODA that matters, but its size relative to the receiving country. Therefore, following Lanati and Thiele (2018), aid variables are measured as ODA per capita relative to the population in countries of origin. Second, a common practice in aid literature (see, for instance, Galiani et al., 2017) is to average ODA measures to smooth yearly fluctuations. Following previous literature (Berthélemy et al., 2009; Dreher et al., 2019; Lanati & Thiele, 2018), aid variables are averaged over a three-year period. This is to say that aid at time t is the average gross ODA disbursement received between t and t-2.

TABLE 6 Robustness check: Alternative measures of governance at origin

	(1)			(2)		
	Ln (Border)	**Ln (Bilat ODA)**	**Ln (Other ODA)**	**Ln (Border)**	**Ln (Bilat ODA)**	**Ln (Other ODA)**
Ln(Bilat ODA)	0.054***			0.054***		
	(0.013)			(0.013)		
Ln(Other ODA)	−0.052	−0.10		−0.051	−0.15	
	(0.091)	(0.19)		(0.091)	(0.19)	
Ln(Immigrant Stock)	0.22***			0.22***		
	(0.026)			(0.027)		
Ln(Pop Origin)	3.84***	−7.44***	−2.20***	3.82***	−7.09***	−2.28**
	(0.90)	(2.20)	(0.87)	(0.90)	(2.21)	(0.87)
Youth (%)	0.054***			0.060***		
	(0.018)			(0.019)		
Unemployment Origin	−0.028			−0.033		
	(0.027)			(0.028)		
Ln(GDPpc Origin)	−1.24***	0.17	0.56**	−1.25***	−0.073	0.66**
	(0.29)	(0.73)	(0.28)	(0.32)	(0.79)	(0.30)
Ln(GDPpc Destination)	3.01***			2.99***		
	(0.81)			(0.81)		
Voice & Accountability Origin	−0.078	0.32	0.25*	−0.14	0.40	0.30*
	(0.18)	(0.44)	(0.14)	(0.19)	(0.48)	(0.15)
Bilat. policy restrict.	−0.095***			−0.094***		
	(0.016)			(0.016)		
Conflict Origin	0.30**	−0.30	0.12	0.27**	−0.25	0.063
	(0.12)	(0.29)	(0.095)	(0.12)	(0.30)	(0.099)
Nat. Disaster Origin	−0.0039	−0.0018	−0.00047	−0.0051	0.0046	0.00086
	(0.016)	(0.040)	(0.013)	(0.016)	(0.040)	(0.013)
Ln(Dist)	−1.55***			−1.55***		
	(0.15)			(0.15)		
Colony	1.07***	3.35***		1.07***	3.35***	
	(0.25)	(0.34)		(0.25)	(0.34)	
Language	−2.18***			−2.18***		
	(0.30)			(0.30)		
Ln(Border)		0.72***	0.13		0.72***	0.16
		(0.054)	(0.11)		(0.054)	(0.11)
Donors' bilat. exports (%)		34.6**			34.7**	

(Continues)

TABLE 6 (Continued)

	(1)			(2)		
	Ln (Border)	**Ln (Bilat ODA)**	**Ln (Other ODA)**	**Ln (Border)**	**Ln (Bilat ODA)**	**Ln (Other ODA)**
		(15.5)			(15.5)	
Trade Openness (GDP%)			−0.00020			−0.0056
			(0.0023)			(0.0024)
Political Stability Origin				−0.041	0.13	−0.10
				(0.11)	(0.28)	(0.090)
Gov. Effectiveness Origin				0.098	0.47	0.36*
				(0.25)	(0.62)	(0.20)
Regulatory Quality Origin				−0.32	1.00	−0.094
				(0.26)	(0.64)	(0.21)
Rule of Law Origin				0.10	−1.35*	−0.28
				(0.31)	(0.76)	(0.25)
Control of Corruption Origin				0.27	0.29	0.031
				(0.26)	(0.64)	(0.21)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2939			2939		
$R2$	0.70	0.70	0.94	0.70	0.69	0.94

Standard errors in parentheses. The model includes the intercept. *p<0.10, **p<0.05, ***p<0.01.

The left-hand side of Table 7 shows that using per capita values instead of gross disbursements does not affect the sign and significance of the coefficients of interest, although it slightly affects size. Increasing bilateral aid per capita by 1% is associated with a 0.092% increase in the number of apprehended migrants. The negative non-significant effect of total aid from all other donors is also confirmed. Similarly, the right-hand side of the same Table 7 confirms that averaging aid over three years does not affect the variables of interest. The positive effect of bilateral aid is confirmed as well as the non-significant coefficient on total aid from all other donors, although the latter does become positive.

5 | DISCUSSION

This article adds to the literature on the relationship between aid and migration by using new data on irregular flows, investigating whether aid is an effective deterrent of illegal border crossings in Spain, Italy and Greece. The more consistent finding is that there is a small attraction effect of bilateral ODA and a non-significant effect of total ODA on irregular migration to Europe.

TABLE 7 Robustness check: Alternative measures of aid

	(1) Aid per capita			(2) 3-year averaged aid		
	Ln(Border)	Ln(Bilat ODApc)	Ln(Other ODApc)	Ln(Border)	Ln(Av. Bilat ODA)	Ln(Av. Other ODA)
Ln(Bilat ODApc)	0.092** (0.037)					
Ln(Other ODApc)	−0.11	−0.33**				
	(0.19)	(0.14)				
Ln(Av. Bilat ODA)				0.044*** (0.015)		
Ln(Av. Other ODA)				0.11	−0.98***	
				(0.10)	(0.19)	
Ln(Immigrant Stock)	0.23***			0.22***		
	(0.027)			(0.026)		
Ln(Pop Origin)	3.61***	−1.89**	−1.69***	4.33***	−7.09***	−3.28***
	(0.93)	(0.79)	(0.44)	(1.02)	(2.05)	(0.74)
Youth (%)	0.044**			0.047**		
	(0.018)			(0.020)		
Unemployment Origin	−0.014			−0.024		
	(0.027)			(0.026)		
Ln(GDPpc Origin)	−1.20***	0.11	−0.092	−1.24***	0.85	0.35
	(0.29)	(0.25)	(0.14)	(0.29)	(0.62)	(0.23)
Ln(GDPpc Destination)	2.82***			3.11***		
	(0.78)			(0.81)		
Political Freedom Origin	0.028	−0.024	−0.043***	0.035	−0.043	−0.044*
	(0.036)	(0.031)	(0.014)	(0.035)	(0.075)	(0.024)
Bilat. policy restrict.	−0.100***			−0.096***		

(Continues)

TABLE 7 (Continued)

	(1) Aid per capita			(2) 3-year averaged aid		
	Ln(Border)	Ln(Bilat ODApc)	Ln(Other ODApc)	Ln(Border)	Ln(Av. Bilat ODA)	Ln(Av. Other ODA)
	(0.015)			(0.015)		
Conflict Origin	0.29**	−0.034	0.12**	0.25**	0.11	0.14*
	(0.12)	(0.10)	(0.049)	(0.12)	(0.25)	(0.079)
Nat. Disaster Origin	−0.0062	0.0060	−0.0018	−0.0063	−0.0043	0.0055
	(0.016)	(0.014)	(0.0065)	(0.016)	(0.034)	(0.011)
Ln(Dist)	−1.62***			−1.67***		
	(0.15)			(0.16)		
Colony	0.97***	2.20***		1.11***	2.72***	
	(0.25)	(0.12)		(0.25)	(0.29)	
Language	−2.14***			−2.17***		
	(0.30)			(0.30)		
Ln(Border)		0.25***	0.0062		0.50***	0.065
		(0.019)	(0.058)		(0.047)	(0.091)
Donors' bilat. exports (%)		−1.98			36.3***	
		(5.39)			(13.6)	
Trade Openness (GDP%)			0.0018			−0.00066
			(0.0012)			(0.0019)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2960			2906		
*R*2	0.70	0.62	0.94	0.70	0.68	0.93

Standard errors in parentheses. The model includes the intercept. *p<0.10, **p<0.05, ***p<0.010.

Bilateral aid is always found to be positive, with sizes ranging from 0.036 to 0.11 when gross ODA disbursements are used to measure aid. The only exception is when only higher-income countries (above USD 8,000 PPP) are considered. In this case, the coefficient implies that increasing bilateral ODA by 1% is associated with a 0.097% decrease in the number of apprehended migrants in that country. To give a sense of the effect size, consider the case of Iraq in 2016, which was the second largest sending country within the higher-income sub-sample and the top recipient of Italy's bilateral ODA. The number of apprehended migrants was 816 while bilateral disbursements amounted to USD 21.5 million (in USD at 2010 prices). The coefficient implies that an additional USD 215,000 would have deterred 1.41 migrants. That is a cost of USD 152,336 per deterred migrant. In other words, a tenfold increase would be needed in Italy's bilateral ODA to Iraq in order to stop irregular migration. Hence, while in this case a significant negative coefficient is found, the effect of bilateral aid on the number of migrants apprehended at the border is still very limited.

The model also estimates the effect of total aid received by origin countries from all donors other than the destination country, with sizes that range from -0.41 to 0.11. This effect is never found statistically significant. This evidence provides very little support that aid has significant deterrent effects on irregular migration.

Comparing the above with results for regular migration, a clear difference emerges. The coefficient of total aid is found to be negative and significant, outweighing the positive effect of bilateral aid. Although only accounting for migration to Spain, Italy and Greece, these results largely confirm recent findings (Gamso & Yuldashev, 2018a; Lanati & Thiele, 2018) that revisited earlier work (Berthélemy et al., 2009). This suggests that, regardless of the sample of destination countries considered, aid has a different impact on irregular migration compared to regular migration.

Nonetheless, in the best-case scenario, estimates presented here show that a 1% increase in aggregate aid disbursements (from all other donors) is associated with a 0.095% decrease in regular migration flows to Spain, Italy and Greece. Taking the case of Pakistan in 2016, which was the largest origin country to Italy in the case of regular migrants, the estimated coefficient implies that an increase in aid from other donors of around USD 36 million is associated with a fourteen-unit decrease in regular migrant flows to Italy. This means a cost of over USD 2.5 million per deterred migrant. Using Morocco, the top origin country to Spain in the same year, the estimated cost is of USD 0.91 million. Thus, while significant, the underlying effect is also small for regular migration. These results corroborate the evidence provided by Clist and Restelli (2020) for the case of Italy. In a similar SEM setting they found that total aid from all other donors has no significant effects on the number of border apprehensions in Italy. This is also the case when asylum applications are used as an alternative dependent variable.

Similarly, results presented here echo Dreher et al.'s finding that total aggregate aid received by a source country has no significant changes in overall refugee outflows in the short term (Dreher et al., 2019). Over a longer horizon (12 to 15 years) they estimate that total aid deters refugee stocks: an increase in total ODA/GDP by one percentage point is associated with a 33% decrease in refugee flows to the OECD. While this appears to be a large effect, let us take the case of Pakistan as above. A one percentage point increase in aid/GDP in 2003–2005 is approximately USD 1.4 billion (in 2010 prices), which their estimates equate with a drop in refugee stocks in 2016 of 1,178. This means the estimated cost of deterring one refugee is about USD 1.2 million. Thus, while the long-term effect is found weakly significant and appears large, the actual effect size is within the range found in this article.

Comparing findings to other previous work, coefficients cannot be directly compared because they refer to different dependent variables: while this article adopted logged irregular flows, other work used emigration rates (see Gamso & Yuldashev, 2018a; Lanati & Thiele, 2018). Lanati and Thiele (2018) find a 1% increase in total aid is associated with a decrease in emigration rates of approximately 0.1%. Taking again the case of Pakistan and Italy in 2016, aid's potential deterrent effect translates into a reduction of the regular emigration rate from 0.00764% to 0.00763% for an additional USD 0.24 in total aid per capita. Keeping population constant, this corresponds to more than USD 3.1 million in aid per deterred migrant (at 2010 prices). The cost drops to USD 0.67 million in the case of Morocco and Spain. Estimates presented in this article indicate a cost per deterred regular migrant that ranges from USD 0.91 to USD 2.5 million (at 2010 prices). While results may appear to be different, the estimated cost per deterred migrant are remarkably similar.

Turning to bilateral aid, results for irregular migration presented here agree with previous work that found a potential *attraction channel* was at work (Berthélemy et al., 2009; Menard & Gary, 2018). However, given the limited magnitude of the underlined effect compared to other determinants (i.e., immigrant stocks), it also supports the argument that individual donor countries have limited ability to affect bilateral immigration flows through bilateral aid (see Lanati & Thiele, 2018).

One exception is found when restricting the sample to higher-income recipients. In this case a significant negative effect of bilateral aid is found. This corroborates Clist and Restelli's (2020) findings for irregular migration to Italy that in OLS estimates retrieve a weakly significant (10%) negative effect of bilateral aid on border apprehensions from higher-income countries. Unfortunately, they do not provide 3SLS estimates for this sub-sample. Murat (2020) may also appear as an exception, showing a significant negative association between bilateral aid and asylum applications to OECD destinations for sending countries with GDP per capita below USD 787 (2005 prices). Yet, the implied costs per deterred migrant tell a very similar story. The largest effect is for countries below USD 411 GDP per capita (in 2005 prices) and equates an additional 1% bilateral aid with a 0.05% drop in asylum applications. The median values for migration and aid in that quintile imply a 0.007 decrease in asylum applications for an additional USD 74,100 spent in bilateral ODA. The cost per deterred asylum application is just over USD 10.5 million. It falls to USD 3.6 million if only the most recent year, 2013, is considered.

Results presented here also support recent evidence that financial constraints have a more limited effect than previously posited (Dao et al., 2018). The idea that foreign aid loosens budgetary constraints causing more migration (De Haas, 2007) is not supported by empirical findings. Instead, there is a consistent negative association between income at origin and irregular migration to Europe. Contrary to the notion that economic development contributes to increased outflows until GDP per capita at origin reaches around USD 8,000 (Berthélemy et al., 2009; Clemens, 2014), a negative relationship with irregular migration to Europe is found for countries below this threshold, as well as above.

One possible explanation is that the role of income levels may be different for irregular migration routes, given that related costs are much higher than for regular migration journeys. In 2015 migrants who entered the EU paid an average of USD 3,200 to USD 6,500 (Europol, 2016; IOM, 2016). With prices so high, limited additional resources through aid are unlikely to be enough to alleviate budget constraints.

6 | CONCLUSION

The link between development aid and migration has recently gained a lot of attention, often in response to donors' claims that aid can be used to address the root causes of migration. This study contributes to the debate on aid's effectiveness at deterring migration by using new data on irregular flows to Europe. It finds consistent evidence of non-significant effects or small effects depending on the source of aid. An apparent "attraction effect" of bilateral aid is confirmed. For total aid there is a non-significant effect. The most optimistic case that can be made is that the cost in bilateral aid per deterred irregular migrant is in the range USD 0.15–0.32 million for countries of origin with a per capita income of over USD 8,000 PPP. For regular migrants, the cost per deterred migrant is in the range of USD 0.9–2.5 million, which is consistent with estimates in previous work.

The study finds no robust evidence that supports either a positive effect through loosening budget constraints or a negative effect through closing income differentials. Further, the relevance of budgetary constraints is also challenged by the negative effect of GDP per capita in source countries: the lower the income at origin the greater the irregular flow to Europe. Other control variables, including the migrant network, population size, bilateral policy restrictiveness and conflict, are also found to be significant determinants of irregular migration to Europe. To conclude, aid does not appear to be an effective tool for deterring migration in the short term.

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