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Remittances and Vulnerability in Developing Countries

## Giulia Bettin, Andrea F. Presbitero, and Nikola L. Spatafora

Abstract

This paper examines how international remittances are affected by structural characteristics, macroeconomic conditions, and adverse shocks in recipient economies. We exploit a novel, rich panel data set, covering bilateral remittances from 103 Italian provinces to seventy-nine developing countries over the period 2005–2011. We find that remittances are negatively correlated with the business cycle in recipient countries and in particular increase in response to adverse exogenous shocks, such as large terms-of-trade declines. This effect is stronger where the migrant communities have a larger share of newly arrived migrants. Finally, we show that recipient-country financial development is negatively associated with remittances, suggesting that remittances help alleviate credit constraints.

This paper examines the drivers of remittances, with a focus on whether remittances should be viewed as a countercyclical shock absorber, helping smooth consumption during a downturn in recipient economies, in contrast to the typically pro-cyclical private capital flows. This issue is particularly salient for two reasons. First, remittances to developing countries have grown steadily relative to capital flows, spurred by growing migration (figure 1). Remittances to developing countries are projected to reach USD 435 billion in 2014, more than three times the size of official development assistance, and USD 500 billion by 2017 (World Bank 2014). Second, remittances have proved very resilient since the onset of the global financial crisis (World Bank 2015).

Giulia Bettin is an assistant professor of economics at the Università Politecnica delle Marche (Italy) and MoFiR; her email address is: g.bettin@univpm.it. Andrea F. Presbitero is an economist at the International Monetary Fund and MoFiR; his email address is: apresbitero@imf.org. Nikola Spatafora (corresponding author) is lead research economist for East Asia and the Pacific at the World Bank; his email address is: nspatafora@worldbank.org. We thank Giacomo Oddo, Roberto Tedeschi, and Simonetta Zappa at the Bank of Italy for clarifications on the remittances dataset. We also thank Andrew Foster, Caglar Ozden, Dilip Ratha, three anonymous referees, and participants at the 4th International Conference "Economics of Global Interactions: New Perspectives on Trade, Factor Mobility and Development," the CSAE Conference 2014: "Economic Development in Africa" (Oxford), and seminars at the International Monetary Fund and the World Bank for useful comments. This research is part of a project on Macroeconomic Research in Low-Income Countries (project id: 60925), supported by the U.K. Department for International Development. The views expressed in this article are those of the authors and do not necessarily represent the views of the International Monetary Fund, the World Bank, or the policies of these institutions. Funding to pay the Open Access publication charges for this article was provided by the U.K. Department for International Development, project on Macroeconomic Research in Low-Income Countries (project id: 60925).

Figure 1. Capital Flows in Developing Countries
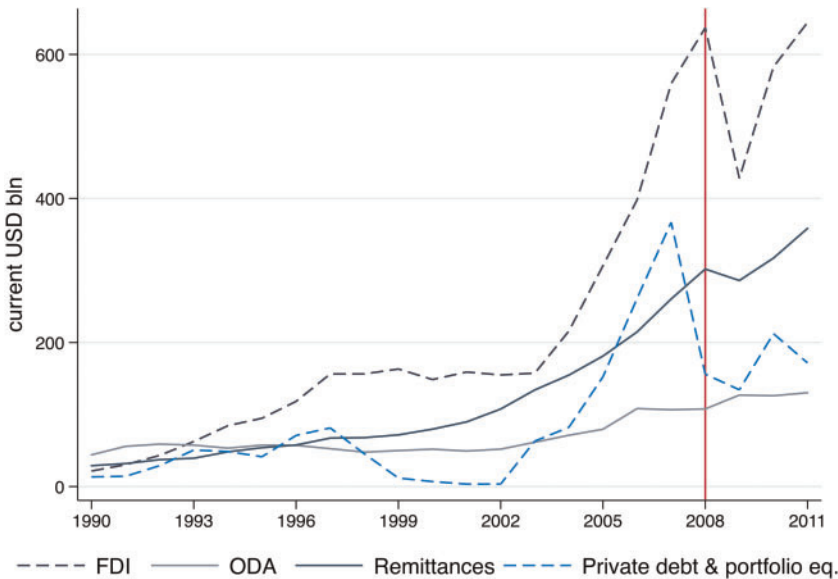
Sources: World Development Indicators and International Debt Statistics (developing countries are defined as low and middle income countries), The World Bank.

The existing empirical evidence on the role of remittances as a shock absorber is inconclusive. Some studies suggest that remittances are countercyclical with respect to output in the recipient country (Chami, Jahjah, and Fullenkamp 2005) because they are driven by altruism (Agarwal and Horowitz 2002; Osili 2007) or because household members migrate as part of a risk-diversification strategy aiming to insure against income shocks (Yang and Choi 2007). Other studies emphasize that remittances can be pro-cyclical, because migrants' decision to remit is also driven by factors such as investment in physical and human capital (Yang 2008; Adams and Cuecuecha 2010; Cooray and Mallick 2013).

This paper re-examines the question using a novel, rich panel dataset, covering bilateral remittances from 103 Italian provinces to seventy-nine developing countries over the period 2005–2011. In this dataset, remittances display significant variability, both over time and across source provinces and recipient countries. Italy can be considered a representative case study given that remittance outflows increased substantially in the last years, notwithstanding the global slowdown, and they flow to all world regions and are not limited to neighboring regions such as Eastern Europe, Central Asia, or Northern Africa.

Specifically, the paper makes three main contributions to the literature. First, the availability of bilateral panel data for a large sample of recipient economies makes it possible to analyze systematically the correlation between remittances and the business cycle in recipient countries, controlling for numerous time-invariant factors at the level of the source-recipient pair. Relatedly, we consider separately the cyclical and trend components in GDP per capita. In addition, we control for specific factors of vulnerability in recipient countries, including in particular natural disasters, large declines in the terms of trade, and armed conflicts. In contrast, the existing literature focuses mainly either on bilateral remittances for a limited sample of recipient countries (Lueth and Ruiz-Arranz 2008; Frankel 2011; Docquier, Rapoport, and Salomone 2012) or on country pairs, such as the US-Mexico or Germany-Turkey corridors (Sayan 2004; Vargas-Silva 2008). Our results are also less likely to be biased by endogeneity, since remittances from Italian provinces (either individually or in the aggregate) are unlikely to affect significantly the business cycle in the recipient country.

Second, we analyze potential sources of heterogeneity in the response of remittances to economic conditions in recipient countries. In particular, we investigate whether remittances from source provinces with faster-growing, more recently arrived migrant communities respond more strongly to downturns in their countries of origin, consistent with more recent migrants being linked more closely by altruistic ties to their countries of origin.

Third, the data on remittances cover the periods both before and after the 2007–08 global financial crisis. This is particularly relevant because the crisis affected both the migrants' origin and host countries, with an a priori ambiguous effect on remittances. On the one hand, the downturn in the country of origin might induce a positive change in remittances driven by altruism or insurance. On the other hand, the recession in the host country would reduce the income of migrants, including in particular temporary workers employed in the construction sector.[1]

Our key finding is that remittances from Italian provinces are negatively correlated with the business cycle in recipient countries and increase especially strongly in response to adverse exogenous shocks, such as declines in the terms of trade. This effect is stronger for communities with a larger share of newly arrived migrants. In addition, remittances are positively correlated with potential GDP in recipient countries. These results are consistent with remittances being driven by both altruism and investment motives. Also, our results indicate that financial development in the recipient country is negatively associated with remittances, suggesting that remittances help alleviate credit constraints; further, international remittances and aid inflows are substitutes.

The paper is structured as follows. Section 1 offers a detailed review of the existing literature on the macroeconomic determinants of remittances. Section 2 describes the data and the estimated model. Section 3 presents selected statistics about remittances outflows from Italian provinces to developing countries. Section 4 discusses the empirical results.

1. Determinants of Remittances: Existing Literature

There exists a large literature on the determinants of migrants' remittances.[2] However, the empirical evidence remains inconclusive as to how remittances react to business cycles in the migrants' home country and whether they help mitigate economic hardship. At the microeconomic level, some studies find that remittances increase to compensate relatives for negative shocks to their income—the *altruism* motive (Agarwal and Horowitz 2002). Other studies find a positive correlation between remittances and the economic conditions of families back home, suggesting that remittances are driven by self-interest motives such as *investment* or inheritance.[3] In any case, positive shocks to migrants' income in host countries are likely to translate into larger remittances (Bettin, Lucchetti, and Zazzaro 2012).[4]

Likewise, some macroeconomic studies find that remittances are negatively correlated with income levels in the recipient country (El-Sakka and McNabb 1999; Chami, Jahjah, and Fullenkamp 2005; Frankel 2011; Singh, Haacker, Lee, and Le Goff 2011), mitigate the adverse effect of food-price shocks on the level and instability of household consumption in vulnerable countries (Combes, Ebeke, Etoundi,

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1 According to the Italian National Institute of Statistics, the unemployment rate for foreign-born workers increased from 10.2 percent in 2005 to 12.1 percent in 2011.

2 Rapoport and Docquier (2006) provide an exhaustive review of modern theoretical and empirical literature on remittances. See also Salomone (2009) and Stark (2009).

3 Lucas and Stark (1985) and Osili (2007) both show that remittances are positively correlated with the income of recipient households. Analogously, de la Briere, Sadoulet, de Janvry, and Lambert (2002) and Hoddinott (1994) show that remittances are positively correlated with household wealth.

4 Macroeconomic studies have considered a wide range of potential determinants, including exchange rates (Faini 1994), interest rate differentials (El-Sakka and McNabb 1999), the size of the diaspora abroad and transaction costs (Freund and Spatafora 2008), the skill and gender composition of migrant stocks (Faini 2007; Adams Jr. 2009; Niimi, Caglar, and Schiff 2010), and the interaction with immigration policies (Docquier, Rapoport, and Salomone 2012).

and Yogo 2014), reduce output growth volatility in developing economies (Bugamelli and Paternò 2011; Chami, Hakura, and Montiel 2012), and react positively to natural disasters (Yang 2008; Mohapatra, Joseph, and Ratha 2012; Ebeke and Combes 2013). In contrast, other studies find that remittances are procyclical with respect to the recipient countries, consistent with an investment motive (Sayan 2004; Sayan 2006; Lueth and Ruiz-Arranz 2008; Giuliano and Ruiz-Arranz 2009; Durdu and Sayan 2010; Cooray and Mallick 2013). And some works do not find any significant correlation either with the business cycle in migrants' home countries (Akkoyunlu and Kholodilin 2008) or with specific shocks such as armed conflicts (Naudé and Bezuidenhout 2012).

Ruiz and Vargas-Silva (2014) argue that the cyclicality of remittances with respect to the recipient economy is country- or corridor-specific and unlikely to be stable over time. In particular, the degree of cyclicality may depend on other country-level characteristics.[5] Relatedly, microeconomic evidence suggests that remittances decline over time, as migrants' commitment and attachment to their relatives and their home country weakens—the "remittance decay" hypothesis.[6]

Recent studies have also investigated whether remittances represent an important channel in propagating global shocks (Barajas, Chami, Fullenkamp, and Garg 2010). Barajas, Chami, Ebeke, and Tapsoba (2012), in particular, show that remittances may prove destabilizing since they are more effective in channeling economic downturns than booms from the source to the recipient countries.

One important limitation of many cross-country analyses of the macroeconomic determinants of remittances is their reliance on aggregate remittance flows to developing countries, disregarding the heterogeneity across source economies. To overcome this limitation, some studies use bilateral data on remittances to control for host countries' characteristics, such as output fluctuations. In most cases, however, the geographical coverage is limited to a single remittance corridor.[7] In other cases, the geographical perspective is wider but still limited. For instance, Lueth and Ruiz-Arranz (2008) use a panel dataset on bilateral remittances for eleven European and Asian recipient countries during the period 1980–2004. The same dataset has been used in Barajas, Chami, Ebeke, and Tapsoba (2012), while Frankel (2011) merges their data with other bilateral data on remittances from the Inter-American Development Bank and the European Commission (Jimenez-Martin, Jorgensen, and Labeaga 2007). Docquier, Rapoport, and Salomone (2012) merge the sources used by Frankel (2011) with a database from the European Central Bank and a Romanian database; the resulting dataset include eighty-nine sending countries but is still limited to forty-six recipient countries, both developing and developed.

Many existing analyses are also subject to endogeneity concerns. In many recipient countries, remittances represent a nonnegligible share of GDP; results might therefore be biased by reverse causality from remittances to GDP, with the exception of the few studies that focus on exogenous income shocks (see, for instance, Yang 2008). In cross-country aggregate analyses, this issue is addressed through GMM techniques (Cooray and Mallick 2013) or instrumental variables.[8] Among studies using bilateral

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5 For instance, Arezki and Brückner (2012) show that the impact of rainfall-driven income shocks on remittance inflows decreases with the level of financial development in the country.

6 Amuedo-Dorantes and Pozo (2006), de la Briere, Sadoulet, de Janvry, and Lambert (2002), Echazarra (2011), and Makina and Masenge (2015), among others, show the existence of an inverted-U shaped pattern of remittances over time, which is consistent with the "remittance decay" hypothesis (Poirine 1997). Remittances first grow due to an increase in migrants' earning power and to the initial strong commitment to the relatives in the home country. Then, as the attachment becomes weaker and temporary migration often translates into permanent settlement, they tend to decrease over time.

7 Sayan (2004) and Akkoyunlu and Kholodilin (2008) focus on the Germany-Turkey remittance corridor, while Vargas-Silva (2008) and Ruiz and Vargas-Silva (2014) look at U.S.-Mexico remittances. Durdu and Sayan (2010) consider both corridors.

8 For instance, Abdih, Chami, Dagher, and Montiel (2012) analyze the impact of remittances on institutional quality and use geographical variables (coastal area, distance to the closest sending country) to instrument remittance inflows. Barajas, Chami, Fullenkam, Gapen, and Montiel (2009) introduce the ratio of remittances to GDP of all other recipient countries, which is likely to proxy for global reductions in transactions costs, as an instrument for remittances.

data, Frankel (2011) addresses endogeneity issues concerning the size of migrant stocks but disregards the possible bias related to recipient countries' GDP. Lueth and Ruiz-Arranz (2008) acknowledge this problem but maintain that GMM estimates based on lagged recipient-country growth confirm their results. However, it remains unclear whether such estimates address the issue satisfactorily, given rising concerns about the performance of GMM in a context of weak instruments and over-fitting of endogenous variables (Roodman 2009; Bazzi and Clemens 2013).

2. Empirical Strategy and Data

The Empirical Model

To identify the effect of business cycle fluctuations and financial development on remittances we estimate a model in which remittances are a function of a set of independent variables constructed by exploiting information on migrants' origin countries and bilateral information at the province-country level. In the baseline specification, total bilateral remittances between the source province i and the recipient country j at time t ($REM_{i,j,t}$) are a function of the logarithm of actual GDP per capita over potential GDP per capita in the recipient country ($CYCLE_{j,t}$), the log of trend GDP per capita ($TREND_{j,t}$), the log of $1 +$ the bilateral stocks of migrants ($MIGRANTS_{i,j,t}$), the log of population level ($POP_{j,t}$), the log of official aid per capita ($AID_{j,t}$), and the log of the share of credit to the private sector over GDP ($FINDEV_{j,t}$):

$$\begin{aligned} REM_{i,j,t} &= \alpha_1 CYCLE_{j,t} + \alpha_2 TREND_{j,t} + \beta_1 MIGRANTS_{i,j,t} \\ &+ \beta_2 POP_{j,t} + \beta_3 AID_{j,t} + \beta_4 FINDEV_{j,t} + \mu_{i,j} + \epsilon_{i,j,t} \end{aligned} \tag{1}$$

where $\epsilon_{i,j,t}$ is the standard error term. To control for any time invariant bilateral unobservables, we include country-province pair fixed effects ($\mu_{i,j}$) in equation 1.[9]

The key coefficient of interest is the response of remittances to the business cycle in the recipient country (α_1). If remittances are countercyclical with respect to output fluctuations in the recipient country ($\alpha_1 < 0$), this suggests an altruistic motivation behind transfers. A positive response of remittances to the long-run output trend in the recipient country ($\alpha_2 > 0$) instead offers evidence in favor of an investment motive for remittances: investment-driven remittances may be particularly sensitive to long-term prospects in the migrants' origin country, as proxied by trend output.

Remittances to country j are expected to be positively associated with the stock of migrants from country j in a given province i ($\beta_1 > 0$). Remittances might also be correlated with the total population of the recipient country ($\beta_2 > 0$): for instance, this might be associated with lower costs of transferring remittances, or proxy for greater investment opportunities.

The sign of the relationship between remittances and aid (β_3) is a priori ambiguous. Remittances and aid could be positively correlated, as found by (Kpodar and Le Goff 2012), reflecting a positive impact of remittances on absorptive capacity in recipient countries or the capacity of the diaspora to influence foreign-aid policy in the host country (Milner and Tingley 2010). Conversely, remittances could be negatively correlated with aid (Amuedo-Dorantes, Pozo, and Vargas-Silva 2007) because they reduce the need for aid and hence donors' willingness to provide it.

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9 In the working paper version of the paper (Bettin, Presbitero, and Spatafora 2014), we also control for a set of province-specific control variables, including time-variant measures of the trend and cyclical component of GDP, population, and financial development at the provincial level. The main results about the counter-cyclical behavior of remittances with respect to economic conditions in the recipient countries are confirmed. When we control explicitly for provincial GDP, we find that remittances are influenced by economic conditions in the migrants' host province, consistent with the view that developing countries that receive sizable remittance inflows are vulnerable to external shocks (Barajas, Chami, Ebeke, and Tapsoba 2012).

As regards financial development in the recipient country, countries with more developed credit markets could attract greater remittances ($\beta_4 > 0$), as a result of either lower transaction costs (Freund and Spatafora 2008) or the capacity of an efficient banking system to channel profit-driven remittances towards growth-enhancing projects (Bettin and Zazzaro 2012). On the other hand, remittances and financial development may be substitutes ($\beta_4 < 0$): migrants whose relatives have limited access to financial resources at home may transfer resources to relax liquidity constraints and fund either consumption or investments in physical and human capital (Giuliano and Ruiz-Arranz 2009).

Since we are interested in assessing the potential role of remittances as shock absorbers in recipient countries, we augment equation 1 by including three specific factors of vulnerability for developing countries, which can plausibly be treated as exogenous: (1) an indicator equal to unity if country j experienced natural disasters in year t ($DISASTER_{j,t}$); (2) an indicator equal to unity if armed conflicts occurred in country j at time t ($WAR_{j,t}$); and (3) the log of the terms-of-trade index ($TT_{j,t}$). Adverse shocks in these exogenous variables, controlling for the cyclical component of output per capita, may be particularly likely to evoke a sympathetic (or, alternatively, insurance-type) response among migrants.

A novel feature of our panel dataset is the bilateral source province-recipient country dimension. This makes it possible to assess whether the reaction of remittances to the cyclical component of GDP in the recipient country depends on the structure of the migrant community at the provincial level. In particular, our hypothesis is that the strength of (altruistic) ties to the country of origin diminishes with time. Further, faster growing migrant communities will on average be more recently settled. We therefore augment the baseline specification (equation 1) by interacting the $CYCLE_j$ variable with the growth rate of the bilateral stock of migrants, $\Delta MIGRANTS_{i,j,[t-n]}$:

$$
\begin{aligned}
REM_{i,j,t} &= \alpha_1 CYCLE_{j,t} + \alpha_2 TREND_{j,t} + \beta_1 MIGRANTS_{i,j,t} \\
&+ \beta_2 POP_{j,t} + \beta_3 AID_{j,t} + \beta_4 FINDEV_{j,t} + \rho_1 \Delta MIGRANTS_{i,j,[t-n]} \\
&+ \rho_2 \Delta MIGRANTS_{i,j,[t-n]} * CYCLE_{j,t} + \mu_{i,j} + \epsilon_{i,j,t}
\end{aligned}
\tag{2}
$$

The growth rate of the migrant stock is computed over time horizons n, ranging from two to four years, and is winsorized at the 99th percentile to minimize the effect of extremely high growth rates stemming from low initial migrant stocks. For robustness, we also estimate an alternative specification employing the growth rate of the migrant stock lagged by two years (that is, $\Delta MIGRANTS_{i,j,[t-2,t-4]}$) in both the level and interaction terms. Under the hypothesis that altruistic feelings decrease over time, a larger share of recently settled migrants will lead to a more negative response of remittances to the cyclical component of GDP ($\rho_2 < 0$).

The Estimator

Since the dependent variable $REM_{i,j,t}$ has a significant share of nonrandomly distributed zeros (that is, many empty country-province cells), equations 1 and 2 are estimated using the Fixed Effects Poisson estimator. Despite deriving originally from the analysis of count data, the Poisson estimator can also be applied to non-negative continuous variables (Wooldridge 2010). Poisson regression estimates are consistent in the presence of heteroskedasticity and more efficient than standard OLS estimates, especially when considering large samples. Thanks to its multiplicative form, the Poisson specification also provides a natural way to deal with zero observations in the dependent variable instead of either transforming or excluding them from the sample (Silva and Tenreyro 2006; Burger, van Oort, and Linders 2009). Additionally, in the Poisson model coefficients on variables expressed in logarithms may be interpreted as elasticities (Cameron and Trivedi 2005). In the baseline estimates, we include country-province pair to control for unobservable heterogeneity; we also include time fixed effects and additionally control for the potential correlation of errors at the bilateral level by clustering standard errors by country-province pairs.

In the robustness section we control for unobservables by including separately country and province fixed effects, instead of country-province pair fixed effects, so as to identify the effect of specific time-

Table 1. Variables: Definition, Sources, and Summary Statistics

Variable	Definition	Source	Mean	St. Dev.
$REM_{i,j,t}$	Total official remittances at constant prices from province i to country j in year t	Bank of Italy	0.888	8.431
$CYCLE_{j,t}$	Logarithm of actual GDP over potential GDP in country j in year t; potential GDP is calculated by applying the Hodrick–Prescott filter (with the smoothing parameter set at 6.25) to the GDP series at constant prices	WEO	0.002	0.019
$TREND_{j,t}$	Logarithm of potential GDP in country j in year t, calculated by applying the Hodrick–Prescott filter (with the smoothing parameter set at 6.25) to the GDP series at constant prices	WEO	10.772	2.445
$MIGRANTS_{i,j,t}$	Logarithm of 1 + the stock of migrants living in province i and coming from country j in year t	ISTAT	4.913	1.604
$WAR_{j,t}$	Indicator = 1 if country j experienced armed conflicts in year t; both interstate and intrastate conflicts are considered, in which the government of country j represents one of the warring parties	UCDP/PRIO Armed Conflict Dataset	0.196	0.397
$DISASTER_{j,t}$	Indicator = 1 if country j experienced natural disasters in year t	EM-DAT, CRED	0.768	0.422
$TT_{j,t}$	Logarithm of the terms-of-trade index of country j	WEO	4.651	0.235
$POP_{j,t}$	Logarithm of population in country j in year t	WDI	16.910	1.537
$FINDEV_{j,t}$	Logarithm of the ratio of domestic credit to the private sector over GDP in country j in year t	WDI	3.350	0.632
$AID_{j,t}$	Logarithm of official aid per capita received in country j in year t	WDI	2.982	1.388
$FISCALBALANCE_{j,t}$	Fiscal balance (+ surplus/ - deficit) as a share of GDP in country j in year t	WDI	−0.017	0.040
$EXTERNAL\ DEBT_{j,t}$	External debt stocks as a share of GDP in country j in year t	WDI	0.384	0.237
$EXECUTIVE\ CONST_{j,t}$	Constraint on the executives' index in country j in year t (1 = unlimited authority; 7 = Executive parity or subordination)	Polity IV - Center for Systemic Peace	5.236	1.709
$\Delta MIGRANTS_{i,j,t-n}$	Percentage growth rate of the migrant stock $MIGRANTS_{i,j,t}$ calculated as $(MIG_{i,j,t} - MIG_{i,j,t-n})/MIG_{i,j,t-n}$. with $n = 2, 3, 4$ The variable is winsorized at the 99th percentile. Statistics are calculated for $n = 2$.	ISTAT	0.377	0.670
$DISTANCE_{i,j}$	Logarithm of the kilometric distance between province i and country j	Built-in STATA routine	8.415	0.764

Notes: WDI: World Development Indicators (The World Bank); WEO: World Economic Outlook (International Monetary Fund); ISTAT: Italian National Institute of Statistic; CRED: Centre for Research on the Epidemiology of Disasters; PRIO: Peace Research Institute Oslo.

Sources: Authors' analysis based on data described in the text.

invariant variables such as bilateral distance to the migrants' country of origin. We also control for the potential correlation of errors at the bilateral level by clustering standard errors by country-province pairs.

Data, Sample, and Sources

The variables used in equations 1 and 2 are constructed using data collected from many sources. Here we provide an overview; a precise definition of each variable and of its sources is in table 1.

The main data source is a detailed panel dataset on bilateral outward remittances from 103 Italian provinces to seventy-nine developing countries, compiled by the Bank of Italy (see table 2 for a list of

Table 2. List of Countries

	Remittances from Italy / Total remittance outflows from Italy (%)	Remittances from Italy / GDP (%)	Remittances from top province in Italy / GDP (%)
EAST ASIA AND THE PACIFIC			
Cambodia	0.0001	0.0001	0.0000
Indonesia	0.0011	0.0000	0.0000
Malaysia	0.0001	0.0000	0.0000
Philippines	0.1151	0.0054	0.0031
Thailand	0.0019	0.0001	0.0000
Vietnam	0.0003	0.0000	0.0000
EUROPE AND CENTRAL ASIA			
Albania	0.0256	0.0166	0.0019
Armenia	0.0001	0.0001	0.0000
Azerbaijan	0.0000	0.0000	0.0000
Belarus	0.0007	0.0001	0.0000
Bosnia and Herzegovina	0.0007	0.0003	0.0001
Georgia	0.0052	0.0037	0.0011
Kazakhstan	0.0003	0.0000	0.0000
Kyrgyz Republic	0.0005	0.0009	0.0003
Moldova	0.0113	0.0169	0.0018
Turkey	0.0042	0.0000	0.0000
Ukraine	0.0208	0.0012	0.0001
LATIN AMERICA AND THE CARIBBEAN			
Argentina	0.0056	0.0001	0.0000
Bolivia	0.0058	0.0028	0.0009
Brazil	0.0279	0.0001	0.0000
Colombia	0.0203	0.0007	0.0001
Costa Rica	0.0004	0.0001	0.0000
Dominica	0.0000	0.0001	0.0000
Dominican Republic	0.0171	0.0028	0.0005
Ecuador	0.0235	0.0031	0.0010
El Salvador	0.0025	0.0009	0.0006
Guatemala	0.0004	0.0001	0.0000
Haiti	0.0001	0.0001	0.0000
Honduras	0.0012	0.0006	0.0002
Jamaica	0.0002	0.0001	0.0000
Mexico	0.0010	0.0000	0.0000
Nicaragua	0.0003	0.0003	0.0001
Panama	0.0004	0.0001	0.0000
Paraguay	0.0011	0.0005	0.0001
Peru	0.0258	0.0016	0.0006
Venezuela, RB	0.0008	0.0000	0.0000
MIDDLE EAST AND NORTH AFRICA			
Algeria	0.0005	0.0000	0.0000
Egypt, Arab Rep.	0.0028	0.0001	0.0000
Iran, Islamic Rep.	0.0001	0.0000	0.0000
Jordan	0.0003	0.0001	0.0000
Lebanon	0.0003	0.0001	0.0000
Libya	0.0010	0.0001	0.0000
Morocco	0.0554	0.0050	0.0006
Tunisia	0.0148	0.0027	0.0002

Table 2. (continued)

	Remittances from Italy / Total remittance outflows from Italy (%)	Remittances from Italy / GDP (%)	Remittances from top province in Italy / GDP (%)
SOUTH ASIA			
Bangladesh	0.0281	0.0025	0.0007
India	0.0223	0.0001	0.0000
Pakistan	0.0090	0.0004	0.0001
Sri Lanka	0.0088	0.0017	0.0004
SUB-SAHARAN AFRICA			
Benin	0.0010	0.0012	0.0001
Burkina Faso	0.0023	0.0022	0.0004
Burundi	0.0001	0.0004	0.0000
Cameroon	0.0025	0.0009	0.0001
Cape Verde	0.0006	0.0031	0.0011
Chad	0.0001	0.0001	0.0000
Congo, Dem. Rep.	0.0011	0.0008	0.0002
Côte d'Ivoire	0.0043	0.0015	0.0001
Ethiopia	0.0006	0.0002	0.0000
Gabon	0.0001	0.0001	0.0000
Gambia, The	0.0004	0.0031	0.0008
Ghana	0.0045	0.0012	0.0001
Guinea	0.0003	0.0005	0.0001
Guinea-Bissau	0.0002	0.0016	0.0002
Kenya	0.0013	0.0003	0.0001
Madagascar	0.0005	0.0005	0.0001
Mali	0.0011	0.0010	0.0001
Mauritania	0.0001	0.0002	0.0000
Mauritius	0.0004	0.0003	0.0001
Mozambique	0.0001	0.0001	0.0000
Niger	0.0002	0.0003	0.0000
Nigeria	0.0092	0.0004	0.0000
Senegal	0.0420	0.0261	0.0027
Seychelles	0.0000	0.0001	0.0000
Sierra Leone	0.0001	0.0005	0.0001
South Africa	0.0002	0.0000	0.0000
Sudan	0.0002	0.0000	0.0000
Tanzania	0.0007	0.0003	0.0001
Togo	0.0012	0.0032	0.0004
Uganda	0.0004	0.0002	0.0000
Zambia	0.0001	0.0001	0.0000

Note: Data computed as averages over the sample period (2005–2011).
Sources: Authors' analysis based on Bank of Italy data.

recipient countries included in the sample).[10] Our sample includes developing countries where data on the control variables for the extended model specification are available; this choice preserves a large coverage in terms of geographical and income distribution. To minimize the noise in the data and the effect of outliers, the estimation sample is limited to countries with at least 200 observations; in addition, we consider province-country pairs for which the bilateral stock of migrants is greater than fifteen

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10 Data on remittance flows to 204 destination countries are collected as part of a monthly survey carried out by the Bank of Italy on a provincial basis since 2005. The dataset is publicly available at: www.bancaditalia.it/statistiche/rapp_estero.

individuals.[11] The dataset provides data on remittances at constant prices and yearly frequency for the period 2005–11. Data consider only remittances sent through formal channels and predominantly reflect transfers carried out through money-transfer operators and the postal system. The banking system has been included in the survey only since 2010, and accounts for 5 to 10 percent of total remittances. All formal transactions are reported, regardless of the amount. As a *caveat*, the dataset does not include remittances sent through informal channels.

Bilateral data on migrant stocks for the period 2005–11, collected by the Italian National Institute of Statistics (ISTAT) from the population registers of Italian municipalities, represent the stock of the foreign population resident in each Italian province, by citizenship, at the beginning of each year. Data on the age structure of the foreign resident population in each province are unavailable. Instead, we use the growth rate of the number of migrants over a two-, three-, or four-year window in each province as a measure of how recently established a migrant community is. The data refer to official foreign residents and do not account for undocumented migrants residing in Italy.

For each recipient country, GDP at constant prices for the period 1950–2012 is drawn from the IMF *World Economic Outlook* database. The cyclical and trend components are extracted using the Hodrick-Prescott filter. Data on total population for the period 2005–11, as well as the level of financial development, proxied by domestic credit to private sector as a share of GDP, are drawn from the *World Development Indicators* database.

The annual frequency of natural disasters is drawn from the *International Emergency Disasters* database (EM-DAT) built by the *Centre for Research on the Epidemiology of Disasters*.[12] Data on armed conflicts are drawn from the UCDP/PRIO Armed Conflict Dataset (Themnér and Wallensteen 2013).[13] The terms of trade are drawn from the IMF *World Economic Outlook* database.

## 3. Remittances from Italy to Developing Countries

Total remittances from Italy to developing countries doubled between 2005 and 2011, reaching almost € 7 billion, in line with the growth in the stock of foreign residents in Italy (figure 2). After 2007, however, the growth rate of remittances slowed down significantly, reflecting the impact of the global financial crisis and of the euro area crisis on Italian output and unemployment. Indeed, remittances declined in 2010, although 2011 saw a rapid recovery, consistent with the global pattern of international remittances (figure 1).

The geographic distribution of remittances from Italy largely mimics the global distribution (figure 3). The East Asia and Pacific region is the main recipient of both Italian and global remittances to developing countries. The region's share of remittances from Italy increased by 10 percentage points between 2005 and 2011. Europe and Central Asia's share of remittances from Italy is twice as high as its share of global remittances, reflecting the relatively large number of migrants from Eastern Europe in Italy. South Asia accounts for a rising share of remittances from both Italy and the world. In contrast, Sub-Saharan Africa accounts for a limited share of remittances.

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11 Our main results are robust to upward and downward changes in those two thresholds.

12 The data are accessible at www.cred.be/emdat/. A disaster is defined as a "situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance." Formally, an event is classified as a disaster whenever it fulfills at least one out of four selection criteria: ten or more people killed; one hundred or more people affected, injured, or homeless following the disaster; declaration of a state of emergency; or calls for international assistance. See www.emdat.be/criteria-and-definition.

13 The most recent version (4-2013) is available at www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed _conflict_dataset/.

Figure 2. Remittance Outflows to Developing Countries and Foreign Residents in Italy
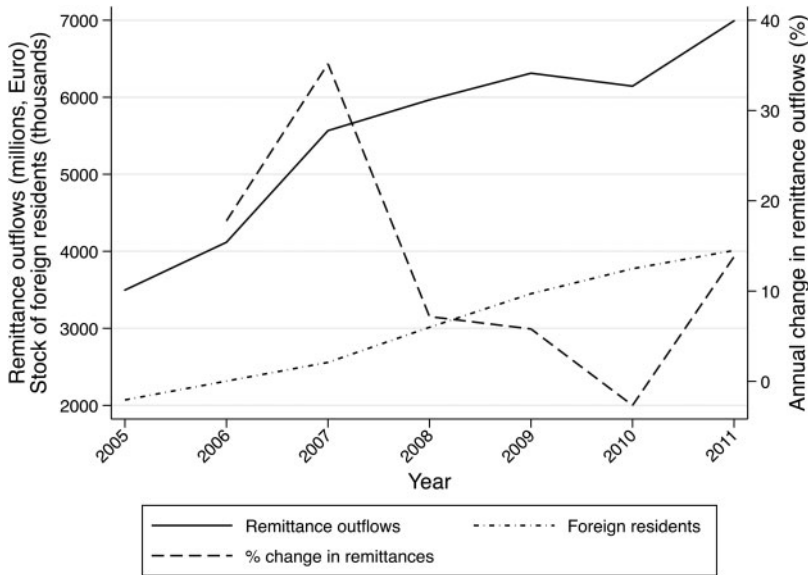
Focusing on individual countries, China, Romania, and the Philippines were the major recipients of remittances from Italy in both 2005 and 2011.[14] Transfers to Bangladesh, Sri Lanka, and Georgia increased dramatically between 2005 and 2011. Colombia is the only country listed that registered a decrease in remittances from Italy over this period. The stock of resident migrants by country of origin is positively correlated with remittances to the relevant recipient country in 2011.[15]

The distribution of foreign residents and their recent growth are highly heterogeneous across Italian provinces. The share of migrants in the total population is much larger in the North than in the South, reflecting the economic divide between northern and southern regions (figure 4, panel a): over the period 2005–2010, foreign residents accounted for about 10% of the population in Prato, Brescia, and Reggio Emilia and 8.5% in Milan. In contrast, in some provinces in the South and the islands (for instance, Oristano, Taranto, and Cagliari), the share of migrants in the total population is around or just above 1%. Even in Naples and Palermo, the largest cities in the South, this share is about 1.5%, while in Rome foreign residents represent 6.6% of the population.

Analyzing recent migration patterns, the growth in foreign residents has varied widely across provinces (figure 4, panel b). Between 2005 and 2010, the overall stock of migrants almost doubled (figure 2), the median province experienced a 94% increase in foreign residents, and the number of migrants increased in all provinces. However, a quarter of all provinces experienced migrant growth rates below 77%, while the number of foreign residents increased by more than 138% in one-tenth of all provinces. The correlation between the growth rate of migrant stocks and the initial share of migrants in the population is negative, that is, provinces with relatively fewer foreign residents attracted more migrants. For instance, in Oristano, where foreign

14 The Italy-China remittance corridor was the single most important at the EU level in 2010. The Italy-Romania and Italy-Philippines corridors were among the ten biggest corridors from Europe. See http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Migrant_remittance_and_cross-border_or_seasonal_compensation_transfer_statistics.

15 There are some outliers, notably China, whose share of total remittances significantly exceeds its share of total migrants. This may reflect an incorrect classification of some trade payments to China as remittances. Owing to this, and to the difficulties in estimating the cyclical component of Chinese GDP, we exclude China from the sample.

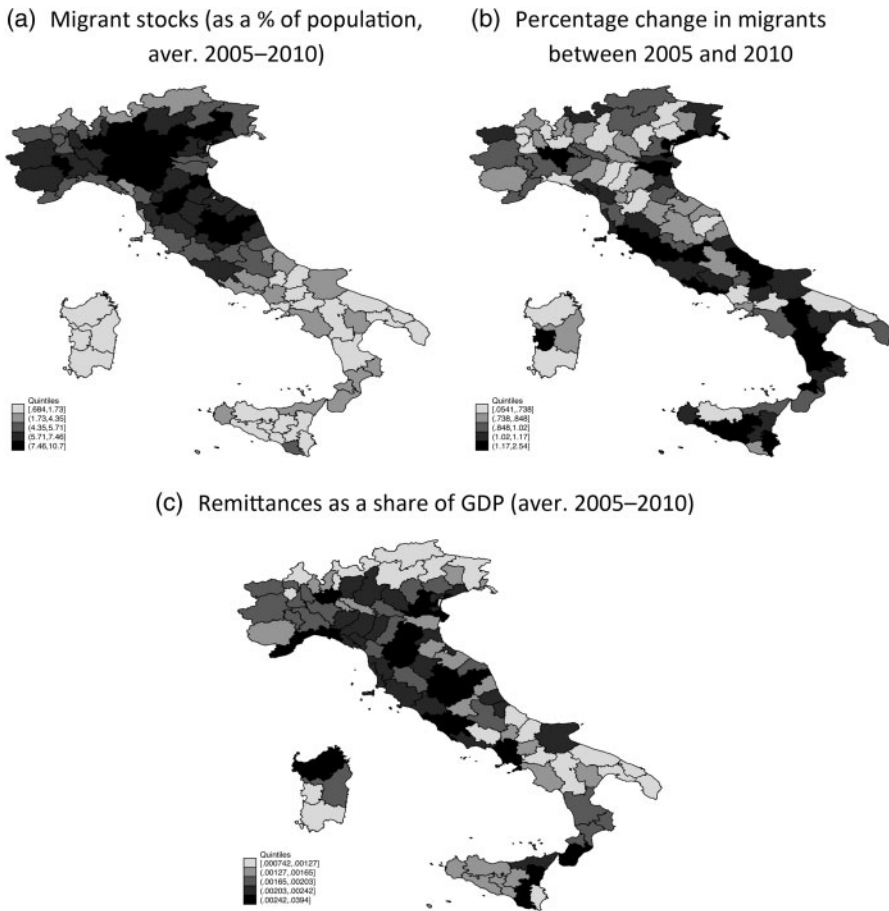**Figure 3.** Remittances by Region of Destination
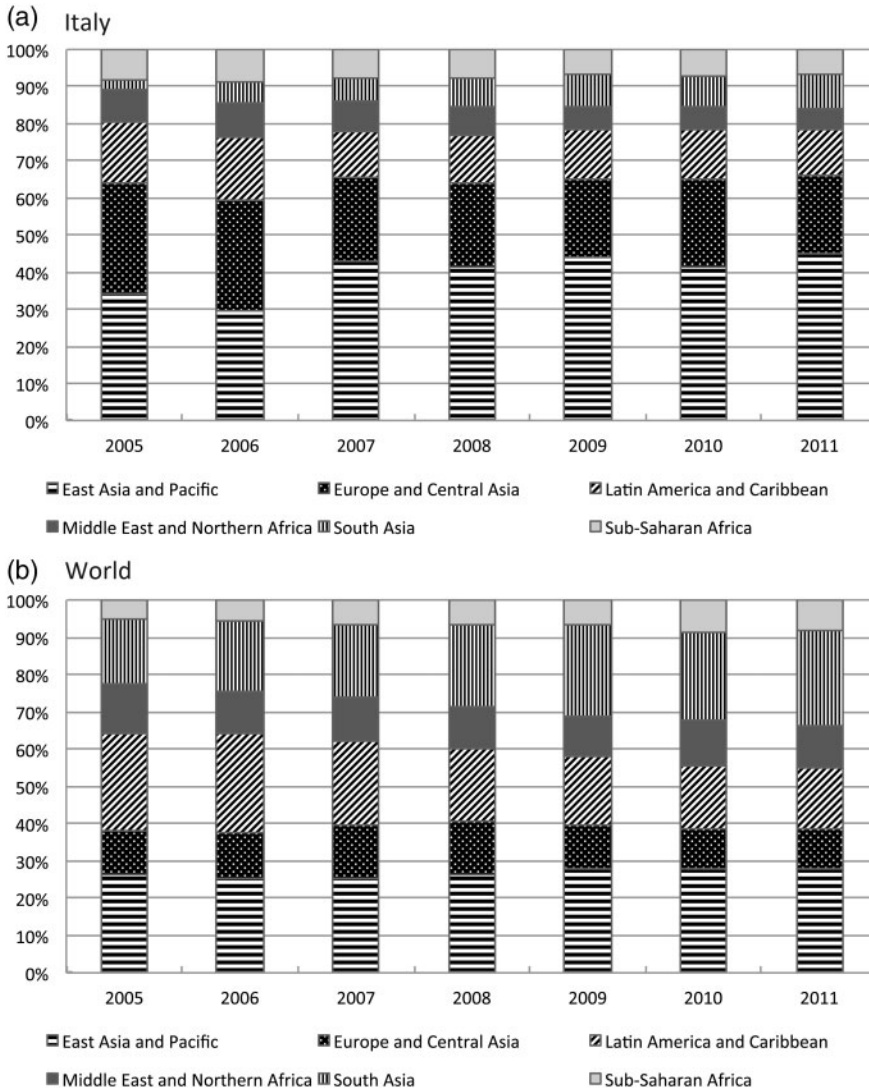
Sources: Bank of Italy and *World Bank Migration & Remittances Factbook 2011*.

resident accounted for only 0.4% of the population in 2005, migrant stocks increased by 150%; in Prato, where foreign residents accounted for 7.8% of the initial population, migrant stocks increased only by 61%.

Migrants' remittances, measured as a share of provincial value added, show a great degree of variability across Italian provinces (figure 4, panel c). Larger remittance outflows reflect primarily the presence of larger migrant communities, although the North-South divide in this case is slightly less marked.[16] Between 2005 and 2010, remittance outflows in the median province on average equaled 0.2% of provincial GDP, ranging from less than 0.1% of GDP in ten Italian provinces (mainly located in the South)

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16 The correlation across Italian provinces between the share of remittances in value added and the share of migrants in the total population equals 0.28.

Figure 4. Remittances and Migrants across Italian Provinces

(a) Migrant stocks (as a % of population, aver. 2005–2010)

(b) Percentage change in migrants between 2005 and 2010

(c) Remittances as a share of GDP (aver. 2005–2010)

Sources: Bank of Italy and ISTAT. See table 1 for definitions. Data on the stock of foreign residents refer to the end of the year. Data on provincial value added are available only until 2010.

to 0.3% of GDP in Genoa, 0.4% in Milan, 0.6% in Florence, 0.9% in Rome, and 3.9% (the maximum value) in Prato, all provinces with a very large share of foreign residents.

In sum, the richness of the dataset in terms of destination countries and the heterogeneity across source provinces make it possible to identify how remittances react to economic shocks in destination countries. In addition, the variability in the localization patterns of migrants across provinces allows us to assess if the response of remittances is affected by the structure of migrant community in the province.

4. Results

The Counter-Cyclicality of Remittances

In estimating equation 1, we start with a parsimonious specification, controlling for the trend and cyclical components of GDP, country size, and migrant stock (table 3, column 1). We then estimate the baseline model (column 2). We then add the three variables capturing exogenous shocks, first one at the time and then jointly (columns 3 through 6). For comparability purposes, these results are based on a common sample driven by the specification with the largest set of controls (column 6). Finally, we show results for the preferred specification, as reported in column 3 but based on the largest available sample (column 7).

Table 3. Baseline and Extended Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MIGRANTS $_{i,j,t}$	0.775***	0.702***	0.699***	0.702***	0.702***	0.699***	0.527***
	[0.162]	[0.111]	[0.104]	[0.111]	[0.112]	[0.104]	[0.105]
POP $_{j,t}$	3.711***	0.169	0.435	0.171	0.166	0.442	−0.243
	[1.281]	[0.827]	[0.841]	[0.827]	[0.818]	[0.835]	[0.612]
CYCLE $_{j,t}$	−3.065***	−2.068***	−1.799***	−2.051***	−2.071***	−1.817***	−1.438***
	[0.426]	[0.455]	[0.489]	[0.505]	[0.460]	[0.536]	[0.406]
TREND $_{j,t}$	1.603***	1.499***	1.096**	1.496***	1.498***	1.099**	1.337***
	[0.513]	[0.466]	[0.497]	[0.465]	[0.464]	[0.497]	[0.358]
FINDEV $_{j,t}$		−0.685***	−0.672***	−0.686***	−0.686***	−0.668***	−0.686***
		[0.134]	[0.126]	[0.137]	[0.134]	[0.128]	[0.111]
AID $_{j,t}$		−0.103***	−0.090***	−0.103***	−0.103***	−0.090***	−0.089***
		[0.013]	[0.011]	[0.013]	[0.013]	[0.011]	[0.014]
TT $_{j,t}$			−0.486***			−0.490***	−0.325**
			[0.180]			[0.179]	[0.134]
DISASTERS $_{j,t}$				−0.004		0.007	
				[0.020]		[0.020]	
WAR $_{j,t}$					0.003	−0.006	
					[0.040]	[0.043]	
Observations	19,130	19,130	19,130	19,130	19,130	19,130	23,419
Number of pair	3,467	3,467	3,467	3,467	3,467	3,467	3,750

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors clustered by country-province pairs. *significant at 10%; **significant at 5%; ***significant at 1%. Estimations are carried out by using the Poisson Fixed Effects estimator. The dependent variable is the value of total official remittances at constant prices from province i to country j in year t ($REM_{i,j,t}$). A constant and a set of province-country pairs (i,j) and year (t) dummies are included.

Sources: Authors' analysis based on data described in the text and table 1.

The results consistently show that remittances increase in response to cyclical output declines in the recipient country, $CYCLE_j$. The reaction of remittances to growth slowdowns is statistically significant and economically relevant across all specifications. The elasticity equals −3 in the most parsimonious specification. It declines (in absolute value) after including the other country-specific controls; in particular, the elasticity equals −1.8 in the specification that includes an indicator for a negative terms-of-trade shock. The elasticity is somewhat smaller in the large sample (column 7) but still statistically significant and well above unity (in absolute value). The absolute (as opposed to proportional) impact on remittances of the recipient country's economic cycle depends on the initial level of remittances, which is in turn a function of the migrant stock residing in a specific province. On average over the sample period, the impact on remittances of a 1 percent cyclical decline in the recipient country's GDP ranges from 13 million US $ for remittances to the Philippines to 263 US $ for remittances to Dominica.

Even controlling for cyclical variations in output per capita, remittances increase significantly in response to a terms-of-trade deterioration, which represents one of the major factors of vulnerability in recipient countries. This result is consistent with a particularly altruistic response to major and/or clearly exogenous shocks. Remittances are approximately 0.5 percent larger when recipient countries experience a one percent decrease in their terms of trade (column 3), reinforcing the response of remittances to cyclical output downturns. Again, this elasticity shrinks slightly when the model is estimated using the large sample (column 7).

We do not find strong evidence of a positive response of remittances to natural disasters, in line with Lueth and Ruiz-Arranz (2008) but in contrast to other studies (Yang 2008; Mohapatra, Joseph, and Ratha 2012; Ebeke and Combes 2013). Again, remittances are not significantly affected by the outbreak of armed conflicts, in line with Naudé and Bezuidenhout (2012).[17] When controlling jointly for these

17 These effects remain insignificant when disasters are expressed as log (1+annual frequency), as in Beine and Parsons (2015) and when armed conflicts are expressed in terms of their annual frequency.

three measures of exogenous shocks, remittances are again negatively associated with the terms of trade, but not with armed conflicts or natural disasters (column 6).

The response of remittances to cyclical fluctuations is stronger in migrant communities that on average have settled more recently, as indicated by the negative and highly significant coefficient on the interaction between the cycle and the (two-year) growth rate of the bilateral stock of migrants, $\Delta MIGRANTS_{i,j,(t;t-2)}$ (table 4, columns 2 and 5). Likewise, the response of remittances to terms-of-trade shocks is stronger in more recently established migrant communities, as indicated by the negative coefficient on the interaction between the terms of trade and the growth rate of the migrant stock (table 4, columns 4 and 5). All this is consistent with the notion that the counter-cyclical behavior of remittances can be attributed to altruistic feelings and that the strength of such feelings diminishes over time.

Moreover, these interaction effects are quantitatively large. The elasticity of bilateral remittances with respect to cyclical GDP equals -1.1 where the migrant community is relatively old ($\Delta MIGRANTS_{i,j,[t,t-2]} = 0$) but more than doubles to -2.5 where the migrant community is relatively young ($\Delta MIGRANTS_{i,j,[t,t-2]} = 1$, that is, the migrant stock doubled in size in the previous two years). Similarly, a one percent terms-of-trade deterioration is associated with a 0.18 percent increase in remittances from relatively old migrant communities but a 0.4 percent increase from relatively young migrant communities. For the median value of $\Delta MIGRANTS_{i,j,[t,t-2]}$ (0.18), the elasticity with respect to cyclical GDP equals -1.3, and a one percent terms-of-trade deterioration is associated with a 0.2 percent increase in remittances.

Robustness checks broadly confirm these results. In particular, when the growth rate of the migrant stock is computed over a three- or four-year period,[18] remittances from more recently established communities remain significantly more responsive to cyclical fluctuations in recipient output, although the interaction with the terms of trade loses statistical significance (table 4, columns 6 and 7). The same applies when the growth rate of the migrant stock is lagged by two years (table 4, column 8).

Overall, these findings suggest that remittances can indeed play a significant role in stabilizing output during downturns, smoothing consumption, and mitigating the effects of macroeconomic fluctuations in developing countries.

Other Results

The elasticity of remittances with respect to trend GDP per capita in recipient countries ranges between 1.1 and 1.6 across different model specifications. The positive association between remittances and trend GDP, a proxy for expected GDP, supports the hypothesis that remittances are driven not only by altruistic motives but also by investment motives.[19]

Remittances are negatively correlated with financial development in recipient countries: on average, a 1 percent reduction in the ratio of domestic credit to the private sector over GDP translates into a 0.7 percent increase in migrants' transfers. This suggests that remittances act as a substitute for financial development, helping to overcome the financing constraints of households living in countries with less efficient financial institutions (Giuliano and Ruiz-Arranz 2009). Remittances and foreign aid are also substitutes, in line with Amuedo-Dorantes, Pozo, and Vargas-Silva (2007), suggesting that they do not reinforce each other in mitigating business-cycle fluctuations in recipient countries. The effect is statistically significant across all specifications, even if the magnitude is relatively modest: on average, a 1 percent increase in aid per capita is associated with a 0.1 percent reduction in remittances. Bilateral remittances are strongly correlated with the size of the migrant community in the source province. This

18 Data availability does not allow us to calculate the change in migrant stocks over longer time horizons. Using a four-year horizon already implies a significant reduction in sample size compared to the baseline regressions (see table 3).

19 Evidence that remittances might be profit-driven is also provided in Lueth and Ruiz-Arranz (2008), where remittances are shown to be positively correlated with the recipient country's growth rate of GDP per capita.

Table 4. Interactions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MIGRANTS $_{ij,t}$	0.398***	0.419***	0.392***	0.394***	0.418***	0.410***	0.350***	0.341***
	[0.136]	[0.139]	[0.134]	[0.136]	[0.139]	[0.110]	[0.081]	[0.083]
$\Delta MIGRANTS_{ij,(t;t-2)}$	−0.065	−0.074	−0.06	0.932	1.116**			
	[0.061]	[0.060]	[0.060]	[0.571]	[0.555]			
$\Delta MIGRANTS_{ij,(t;t-3)}$						0.558		
						[0.370]		
$\Delta MIGRANTS_{ij,(t;t-4)}$							−0.216	
							[0.248]	
$\Delta MIGRANTS_{ij,(t-2;t-4)}$								0.004
								[0.309]
POP $_{j,t}$	−0.902*	−0.883*	−0.69	−0.698	−0.669	−0.421	0.221	−0.238
	[0.518]	[0.521]	[0.518]	[0.510]	[0.511]	[0.511]	[0.517]	[0.498]
CYCLE $_{j,t}$	−1.544***	−1.107***	−1.375***	−1.394***	−0.895***	−0.636**	−0.568*	−0.890***
	[0.241]	[0.289]	[0.251]	[0.252]	[0.299]	[0.297]	[0.291]	[0.288]
TREND $_{j,t}$	1.688***	1.668***	1.552***	1.535***	1.502***	1.599***	1.826***	1.722***
	[0.229]	[0.227]	[0.227]	[0.230]	[0.228]	[0.214]	[0.223]	[0.224]
AID $_{j,t}$	−0.059***	−0.059***	−0.055***	−0.054***	−0.054***	−0.056***	−0.057***	−0.055***
	[0.013]	[0.013]	[0.014]	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]
FINDEV $_{j,t}$	−0.460***	−0.457***	−0.475***	−0.476***	−0.474***	−0.486***	−0.496***	−0.489***
	[0.073]	[0.073]	[0.073]	[0.073]	[0.072]	[0.071]	[0.072]	[0.073]
TT $_{j,t}$	−0.178***	−0.197***	−0.219***	−0.177***	−0.178***	−0.197***	−0.264***	−0.238***
	[0.061]	[0.062]	[0.055]	[0.062]	[0.061]	[0.062]	[0.065]	[0.059]
CYCLE $_{j,t}$*$\Delta MIGRANTS_{ij,(t;t-2)}$		−1.373**			−1.556**			
		[0.588]			[0.621]			
CYCLE $_{j,t}$*$\Delta MIGRANTS_{ij,(t;t-3)}$						−1.252***		
						[0.297]		
CYCLE $_{j,t}$*$\Delta MIGRANTS_{ij,(t;t-4)}$							−0.500***	
							[0.104]	
CYCLE $_{j,t}$*$\Delta MIGRANTS_{ij,(t-2;t-4)}$								−0.501**
								[0.197]
TT $_{j,t}$*$\Delta MIGRANTS_{ij,(t;t-2)}$				−0.214*	−0.256**			
				[0.125]	[0.120]			
TT $_{j,t}$*$\Delta MIGRANTS_{ij,(t;t-3)}$						−0.131		
						[0.080]		
TT $_{j,t}$*$\Delta MIGRANTS_{ij,(t;t-4)}$							0.044	

Table 4. (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$TT_{j,t} * \Delta MIGRANTS_{ij;(t-2;t-4)}$							[0.053]	−0.000
								[0.066]
Observations	16,670	16,670	16,670	16,670	16,670	16,670	16,670	16,670
Number of pair	3,621	3,621	3,621	3,621	3,621	3,621	3,621	3,621

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors clustered by country-province pairs. *significant at 10% level; **significant at 5% level; ***significant at 1% level. Estimations are carried out using the Poisson Fixed Effects estimator. The dependent variable is the value of total official remittances at constant prices from province i to country j in year t ($REM_{ij,t}$). A constant and a set of province-country pairs (i, j) and year (t) indicators are included.

Sources: Authors' analysis based on data described in the text and table 1.

Table 5. Robustness: Sample Definition

	(1) Low-income countries	(2) Middle-income countries	(3) Large migrant communities	(4) No large recipients
MIGRANTS $_{i,j,t}$	0.740***	0.610***	0.879***	0.735***
	[0.149]	[0.115]	[0.153]	[0.130]
POP $_{j,t}$	−18.750***	0.421	0.455	−0.437
	[2.238]	[0.922]	[0.969]	[0.887]
CYCLE $_{j,t}$	−5.720***	−2.287***	−2.249***	−1.889***
	[1.401]	[0.457]	[0.472]	[0.454]
TREND $_{j,t}$	−2.684***	1.018**	1.489***	1.918***
	[0.753]	[0.487]	[0.522]	[0.575]
AID $_{j,t}$	−0.234***	−0.099***	−0.106***	−0.099***
	[0.056]	[0.015]	[0.012]	[0.015]
FINDEV $_{j,t}$	−0.008	−0.678***	−0.714***	−0.799***
	[0.200]	[0.145]	[0.137]	[0.151]
Observations	2,554	16,576	9,266	17,112
Number of pair	503	2,964	1,684	3,153

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors clustered by country-province pairs. *significant at 10% level; **significant at 5% level; ***significant at 1% level. Columns 1 and 2 report estimates based on, respectively, low- and middle-income countries, as defined by the World Bank. Column 3 excludes all country-province-year observations for which the stock of migrants is less than one hundred individuals. Column 4 excludes large worldwide remittances recipients (China, India, Indonesia, Brazil, Nigeria, Pakistan, Bangladesh). Estimations are carried out using the Poisson Fixed Effects estimator. The dependent variable is the value of total official remittances at constant prices from province i to country j in year t ($REM_{i,j,t}$). A constant and a set of province-country pairs (i,j) and year (t) indicators are included.

Sources: Authors' analysis based on data described in the text and table 1.

finding is consistent with a large body of literature (Lueth and Ruiz-Arranz 2008; Frankel 2011; Docquier, Rapoport, and Salomone 2012). The elasticity is generally stable at around 0.7 across alternative specifications, similar to the value of 0.8 estimated by Docquier, Rapoport, and Salomone (2012) using a Poisson regression. The populations of the origin country, POP_j, is positively associated with remittance flows. This may reflect either lower costs of sending remittances to larger countries, or simply greater investment opportunities. However, the coefficient is statistically significant only in the most parsimonious specification (column 1) and is less precisely estimated once we control for aid flows and the level of financial development.

Robustness Checks

This section tests the robustness of the findings. We first investigate the impact of changes in the sample composition (table 5). We then allow for additional covariates (table 6). Finally, we employ a different estimation method (table 7).

Different samples   We test the validity of the finding about the cyclical response of remittances across a number of alternative subsamples. First, we split the sample between low-income and middle-income countries (table 5, column 1 and 2, respectively) to analyze whether the countercyclical behavior of remittances depends on the recipient country's income level. The coefficient on $CYCLE_j$ remains negative in both cases, although the countercyclical effect is much stronger in low-income countries ($\alpha_1 = -5.7$) than in middle-income countries ($\alpha_1 = -2.3$). In low-income countries, the coefficient on trend GDP is negative, suggesting a more limited investment motive for remittances. In these countries, the negative correlation between remittances and aid is also stronger (perhaps because foreign aid is larger and more variable, so that its effects can be more precisely estimated), suggesting that remittances could help offset limited aid flows.

Table 6. Robustness: Additional Covariates

	(1)	(2)	(3)	(4)
MIGRANTS $_{i,j,t}$	0.528***	0.542***	0.396***	0.401***
	[0.139]	[0.141]	[0.092]	[0.092]
POP $_{j,t}$	−1.603	−1.413	−7.723***	−8.604***
	[1.247]	[1.096]	[1.371]	[1.568]
CYCLE $_{j,t}$	−3.194***	−2.432***	−1.382***	−2.257***
	[0.534]	[0.558]	[0.411]	[0.852]
TREND $_{j,t}$	2.092***	2.076***	2.168***	2.246***
	[0.559]	[0.567]	[0.540]	[0.522]
FINDEV $_{j,t}$	−0.837***	−0.840***	−0.664***	−0.691***
	[0.130]	[0.127]	[0.161]	[0.154]
AID $_{j,t}$	−0.092***	−0.096***	−0.135***	−0.139***
	[0.013]	[0.012]	[0.044]	[0.044]
FISCAL BALANCE $_{j,t}$	1.856***			1.374*
	[0.525]			[0.800]
EXTERNAL DEBT $_{j,t}$		0.014		−0.19
		[0.199]		[0.165]
EXECUTIVE CONST $_{j,t}$			0.234***	0.237***
			[0.032]	[0.033]
Observations	16,129	16,079	8,463	8,463
Number of pair	2,772	2,760	1,389	1,389

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors clustered by country-province pairs. *significant at 10% level; **significant at 5% level; ***significant at 1% level. Estimations are carried out using the Poisson Fixed Effects estimator. The dependent variable is the value of total official remittances at constant prices from province i to country j in year t ($REM_{i,j,t}$). A constant and a set of province-country pairs (i, j) and year (t) indicators are included.

Sources: Authors' analysis based on data described in the text and table 1.

Next, we drop observations that may add noise and lead to small-sample bias. In particular, we are concerned about province-country pairs that are characterized by a limited number of resident migrants. Here, remittances may be driven by idiosyncratic factors, which could be largely unrelated to macroeconomic conditions in the recipient country as a whole. To avoid this possibility, we exclude all observations where the migrant community numbers less than one hundred migrants ($MIGR_{ijt} < 100$), rather than using the threshold as in the baseline model. Although this threshold implies dropping fifteen countries (all provinces are still included in the sample) and reduces the original sample by about one-half, the results from our baseline model remain valid (column 3).[20] A related concern is that, in large recipient countries, macroeconomic conditions could be highly heterogeneous within the country. Further, migrant remittances may be largely driven by conditions within some region of the country, rather than in the recipient country as a whole. Hence, we drop from the sample the recipient countries with the largest population (Bangladesh, Brazil, China, India, Indonesia, Nigeria, and Pakistan).[21] Again, the earlier findings are confirmed, even controlling for other explanatory variables (column 4).

Additional covariates We next augment the baseline model with additional regressors and find a positive impact on remittances of macroeconomic stability and institutional quality in the recipient country (table 6). In particular, remittances are larger to countries with higher fiscal balances (as a ratio of GDP) or with stronger institutions (as measured by the constraints on the executive; cf. Singh, Haacker, Lee, and Le Goff 2011). In contrast, external debt does not have a significant impact. The negative effect on remittances of the cyclical component of output in recipient countries holds even when controlling jointly for these covariates (column 4).

20 Results are robust to alternative specifications of the threshold up to $MIGR_{ijt} < 500$.
21 We drop countries with a total population above the 95th percentile of the sample distribution.

Table 7. Robustness: PPML Estimator—Baseline and Extended Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MIGRANTS $_{i,j,t}$	0.948***	0.948***	0.948***	0.948***	0.948***	0.948***	0.928***
	[0.039]	[0.038]	[0.038]	[0.038]	[0.038]	[0.038]	[0.035]
POP $_{j,t}$	3.869***	0.399	0.65	0.407	0.383	0.646	0.359
	[1.149]	[0.796]	[0.813]	[0.796]	[0.787]	[0.806]	[0.622]
DISTANCE $_{i,j}$	0.443***	0.445***	0.444***	0.445***	0.445***	0.444***	0.403***
	[0.160]	[0.159]	[0.159]	[0.159]	[0.160]	[0.159]	[0.148]
CYCLE $_{j,t}$	−2.981***	−1.945***	−1.694***	−1.899***	−1.957***	−1.690***	−1.440***
	[0.485]	[0.471]	[0.498]	[0.515]	[0.475]	[0.540]	[0.409]
TREND $_{j,t}$	1.595***	1.466***	1.093**	1.457***	1.464***	1.092**	1.294***
	[0.499]	[0.461]	[0.486]	[0.460]	[0.459]	[0.485]	[0.357]
FINDEV $_{j,t}$		−0.686***	−0.673***	−0.689***	−0.690***	−0.675***	−0.669***
		[0.131]	[0.122]	[0.133]	[0.131]	[0.124]	[0.105]
AID $_{j,t}$		−0.107***	−0.093***	−0.106***	−0.106***	−0.093***	−0.092***
		[0.012]	[0.011]	[0.012]	[0.013]	[0.011]	[0.012]
TT $_{j,t}$			−0.454***			−0.452***	−0.291**
			[0.173]			[0.171]	[0.125]
DISASTERS $_{j,t}$				−0.011		−0.002	
				[0.021]		[0.020]	
WAR $_{j,t}$					0.011	0.003	
					[0.042]	[0.045]	
Observations	19,130	19,130	19,130	19,130	19,130	19,130	23,419
R-squared	0.901	0.914	0.915	0.914	0.914	0.915	0.897

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors clustered by country-province pairs. *significant at 10% level; **significant at 5% level; ***significant at 1% level. Estimations are carried out using the Poisson Pseudo Maximum Likelihood (PPML) estimator (Silva and Tenreyro 2006). The dependent variable is the value of total official remittances at constant prices from province i to country j in year t ($REM_{i,j,t}$). A constant and a set of province (i), country (j), and year (t) indicators are included.

Sources: Authors' analysis based on data described in the text and table 1.

Different fixed effects   The last robustness exercise relates to the fixed effects in our estimation. Here, we drop country-province pair fixed effects and control separately for country and province fixed effects. Our main results from the baseline and the augmented specification, and in particular the significant negative coefficient on the cyclical component of recipient GDP, are largely confirmed (tables 7). The magnitude of the elasticities is also quite similar, lending support to the validity of our main findings.

The distance to migrants' home country, $DISTANCE_{i,j}$, is positively correlated with remittances. A priori, we would instead expect distance to be positively correlated with remittance transfer costs and therefore negatively correlated with remittances.[22] The result may arise because remittance data only takes into account official transactions. Migrants from nearby regions, such as Eastern Europe or the Mediterranean, may send remittances informally, for instance bringing them in person when they travel back home. In contrast, migrants from distant countries are relatively more likely to use formal, if expensive, remittance channels.

5. Conclusions

We analyze how remittances are affected by structural characteristics, macroeconomic conditions, and adverse shocks in both source and recipient economies using a novel, rich panel dataset on bilateral

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22 Lueth and Ruiz-Arranz (2008), Frankel (2011), and Docquier, Rapoport, and Salomone (2012) indeed find a negative, significant correlation between remittances and bilateral distance.

remittances from 103 Italian provinces to seventy-nine developing countries over the period 2005–2011. Remittances are negatively correlated with the business cycle in recipient countries and increase especially strongly in response to adverse exogenous shocks, such as large declines in the terms of trade. The counter-cyclical behavior of remittances is stronger in provinces where the migrants' community has a larger share of newly arrived migrants. These results are consistent with international remittances being driven at least partly by altruism motives.

We also find that remittances are positively correlated with potential GDP in recipient countries, that remittances and foreign aid are substitutes, and that financial development in the recipient country is negatively associated with remittance transfers, suggesting that remittances help alleviate credit constraints. All these results hold even controlling for unobserved country-province pairs fixed effects, which capture time-invariant institutional and geographical factors, which may drive remittance flows.

We conclude that remittances may indeed contribute significantly to macroeconomic stability in recipient countries. This effect should be considered together with their positive impact on poverty alleviation and growth, emphasized in the existing literature. From a policy perspective, our results suggest that reducing barriers to remittances to developing countries, by reducing these countries' reliance on more volatile capital inflows, may also increase their resilience to exogenous shocks. One way to achieve this is to reduce barriers to international migration (Clemens 2011). In addition, it remains important to promote migrants' access to financial services in host countries. Overall, these findings corroborate the efforts being carried out by international financial institutions and the private sector to reduce the costs of migrant remittances and to foster freer remittance flows.

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