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Remittances and Vulnerability in Developing Countries

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IMF Working Paper

Research Department

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Abstract

This paper examines how international remittances are affected by structural characteristics, macroeconomic conditions, and adverse shocks in both source and recipient economies. We exploit a novel, rich panel data set, covering bilateral remittances from 103 Italian provinces to 107 developing countries over the period 2005-2011. We find that remittances are negatively correlated with the business cycle in recipient countries, and increase in response to adverse exogenous shocks, such as natural disasters or large declines in the terms of trade. Remittances are positively correlated with economic conditions in the source province. Nevertheless, in the presence of similar negative shocks to both source and recipient economies, remittances remain counter-cyclical with respect to the recipient country.

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1 Introduction

Developing countries remain extremely vulnerable to adverse exogenous shocks. The global financial crisis and the world food price crisis of 2008 delivered a reminder of their macroeconomic, external, and fiscal vulnerabilities (Figure 1, left panel). In addition, over the past decades developing countries have been increasingly subject to natural disasters, again with severe consequences in terms of output, trade, and fiscal balances (Raddatz, 2007; Noy, 2009). As a result, the policy debate is again focusing on developing countries' vulnerability (Schindler *et al.*, 2011).

This paper examines how remittances are affected by structural characteristics, macroeconomic conditions, and adverse shocks in both source and recipient economies. It therefore sheds light on whether remittances should be viewed as a counter-cyclical shock absorber, helping smooth consumption during a downturn, in contrast to the typically pro-cyclical private capital flows. This issue is particularly salient for two reasons. First, spurred by increasing migration, remittances to developing countries have grown steadily relative to capital flows (Figure 1, right panel). Remittances to developing countries are projected to reach USD 414 billion in 2013, more than three times the size of official development assistance, and USD 540 billion by 2016 (The World Bank, 2013). Second, remittances have proved very resilient since the onset of the global financial crisis.

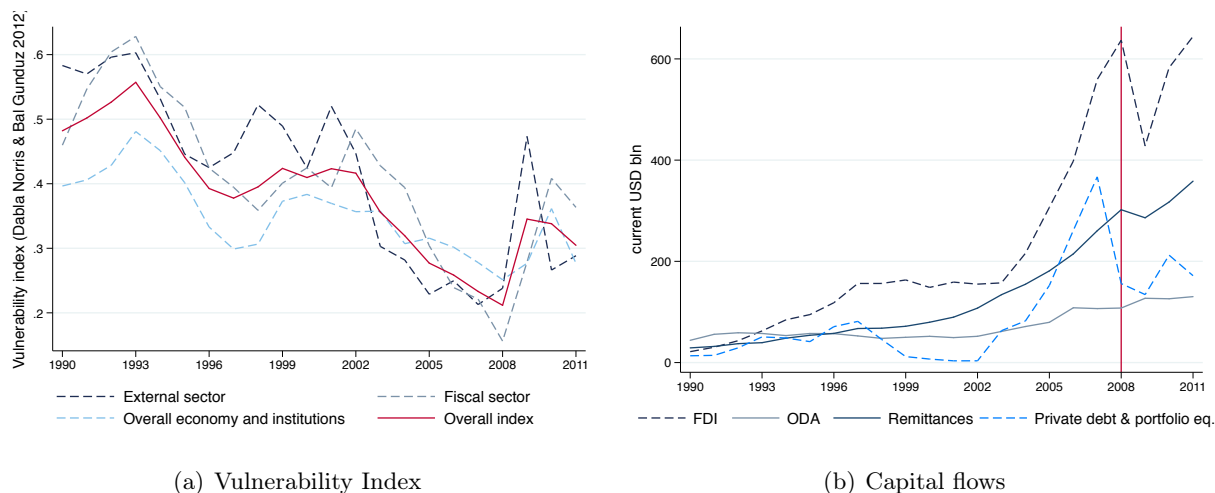
The existing empirical evidence on the role of remittances as a shock absorber is inconclusive. Some studies suggest that remittances are counter-cyclical with respect to output in the recipient country, because they are driven by altruism (Agarwal and Horowitz, 2002; Osili, 2007), or because household members migrate as part of a risk-diversification strategy aiming to insure against income shocks (Yang and Choi, 2007). Others 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 Jr. and Cuceuecha, 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 107 developing countries over the period 2005-2011, to estimate a gravity model for remittances. In this dataset, remittances display significant variability, both over time and across source provinces and recipient countries.

More specifically, the paper makes three main contributions to the literature. First, the availability of bilateral data for a large sample of recipients makes it possible to analyze systematically the correlation between remittances and the business cycle in both source and recipient economies. 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 small sample of countries in Asia and Europe (Lueth and Ruiz-Arranz, 2008; Frankel, 2011), or on country pairs, such as the US-Mexico or the Germany-Turkey corridors (Sayan, 2004; Vargas-Silva, 2008). As a result, existing works fail to settle the empirical debate on the correlation between remittances to developing countries and their business cycle.

Related to this, our data on remittances cover the periods before and after the 2007-08 financial crisis, allowing an analysis of the correlation between remittances and economic conditions in source

Figure 1: Vulnerability and capital flows in developing countries



Source: World Development Indicators and International Debt Statistics (developing countries are defined as low and middle income countries), The World Bank, for the left panel. Data for the right panel are elaboration on the Vulnerability Index data set. See [Dabla-Norris and Bal-Gunduz \(2012\)](#) for details on how the index and its sub-components are constructed.

and recipient economies during the global financial crisis. This is particularly relevant because the global financial crisis affected jointly the migrants' home and host countries, with an *a priori* ambiguous effect on remittances. On the one hand, the downturn in the home country 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

Second, we deal with the possible endogeneity of the business cycle in the recipient country more satisfactorily than previous studies. Reverse causality from remittances to output may significantly bias estimates, since remittances often represent a large share of developing countries' GDP, and they have been found to affect both output growth and financial development ([Gupta et al., 2009](#); [Giuliano and Ruiz-Arranz, 2009](#); [Bettin and Zazzaro, 2012](#)). In some cases, most of the transfers come from a limited set of origin countries, so that even bilateral remittances represent a significant share of GDP, potentially leading to reverse-causality issues in cross-country bilateral data. According to the data in [Lueth and Ruiz-Arranz \(2008\)](#), during 2002-2004 remittances from Russia to Tajikistan equalled on average almost 12 percent of Tajikistan's GDP, while remittances from the USA to the Philippines represented almost 5 percent of the Philippines' GDP.² To the best of our knowledge, the existing studies either disregard this issue, or deal with it relying on lagged values or other internal instruments. However, such a strategy is not likely to fully solve the problem. Finding good instruments in a cross-country dataset is challenging, since one needs a variable which is related to economic conditions in the recipient country, but not to remittances.

¹According 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. The figures for native workers were respectively 7.6 percent in 2005 and 8.0 percent in 2011.

²We thank Marta Ruiz Arranz for sharing the data on bilateral remittances.

The structure of our dataset makes it possible to circumvent this problem: considering only remittances from Italian provinces, rather than aggregate remittance inflows, significantly attenuates the endogeneity of the recipient country’s business cycle.

Third, we investigate the relationship between remittances and financial development in the remittance *source* economy. The literature has generally focused on financial development in the recipient country, finding that remittances promote financial development (Gupta *et al.*, 2009) and that financial development enhances the impact of remittances on growth (Giuliano and Ruiz-Arranz, 2009; Bettin and Zazzaro, 2012). In contrast, we exploit the cross-sectional dimension of the bilateral dataset to test whether the degree of development and the proximity of source-province credit markets play a role in fostering remittances.

We find 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 natural disasters or large declines in the terms of trade. 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.

Remittances are also positively correlated with economic conditions in the source province. Nevertheless, in the presence of similar negative shocks to both source and recipient economies, remittances remain counter-cyclical with respect to the recipient country.

Finally, remittances are positively associated with financial development in the source province, and negatively associated with financial development in the recipient country. This suggests that source-province financial development reduces transaction costs and eases access to financial services for migrants, and that remittances help alleviate credit constraints in recipient countries.

The paper is structured as follows. Section 2 offers a detailed review of the existing literature on the macroeconomic determinants of remittances. Section 3 presents selected statistics about remittances outflows from Italian provinces to developing countries. Section 4 describes the data and the estimated model. Section 5 discusses the empirical results.

2 Literature Survey

There is a large literature on the determinants of migrants’ remittances.³ 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). Others 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.⁴ In any case, positive shocks to migrants’ income in host countries are likely to translate into larger remittances (Bettin *et al.*, 2012).

³Rapoport and Docquier (2006) provide an exhaustive review of modern theoretical and empirical literature on remittances.

⁴Lucas and Stark (1985) and Osili (2007) both show that remittances are positively correlated with the income of recipient households. Analogously, de la Briere *et al.* (2002) and Hoddinott (1994) show that remittances are positively correlated with household wealth.

Macroeconomic studies have considered a wide range of potential determinants, including exchange rates (Faini, 1994; Higgins *et al.*, 2004), interest rate differentials (El-Sakka and McNabb, 1999; Lianos, 1997), the size of the diaspora abroad and transaction costs (Freund and Spatafora, 2008), the skill composition of migrant stocks (Faini, 2007; Adams Jr., 2009; Niimi *et al.*, 2010), and the interaction with immigration policies (Docquier *et al.*, 2012). However, they remain inconclusive as to how remittances react to business cycles in the migrants' home country, and whether they help mitigate economic hardship. Many studies find that remittances are negatively correlated with income levels in the recipient country (El-Sakka and McNabb, 1999; Bouhga-Hagbe, 2006; Singh *et al.*, 2011), that remittances mitigate the adverse effect of food-price shocks on the level and instability of household consumption in vulnerable countries (Combes *et al.*, 2014), that remittances reduce output growth volatility in developing economies (Bugamelli and Paternò, 2011; Chami *et al.*, 2012) or that remittances react positively to natural disasters (Yang, 2008; Mohapatra *et al.*, 2012; Ebeke and Combes, 2013). Others, however, find that remittances are procyclical with respect to the recipient countries (Giuliano and Ruiz-Arranz, 2009; Sayan, 2006; Cooray and Mallick, 2013); also, Naudé and Bezuidenhout (2012) finds that the outbreak of armed conflict has no impact on remittances to Sub-Saharan Africa.⁵

Several studies use bilateral data on remittances to control for the impact of output fluctuations in host countries. However, they have failed to settle the debate on the cyclicity of remittances. For instance, time-series analyses which focus on the Germany-Turkey remittance corridor provide conflicting results. Some studies find that remittances are procyclical with respect to Turkish output and acyclical with respect to German output (Sayan, 2004; Durdu and Sayan, 2010). Others find that remittances respond positively to German output, with no significant reaction to the economic situation in Turkey (Akkoyunlu and Kholodilin, 2008). Empirical studies of U.S.-Mexico remittances agree that remittances vary countercyclically with Mexico's output but do not find any impact from the U.S. business cycle (Durdu and Sayan, 2010; Vargas-Silva, 2008).

A few contributes have adopted a wider geographical perspective. Lueth and Ruiz-Arranz (2008) use a panel dataset on bilateral remittances for 11 European and Asian recipient countries during the period 1980-2004 to estimate a gravity model which includes both home and host country characteristics as explanatory variables. Remittances are found to be procyclical and to not increase in response to adverse shocks in the home country. In contrast, by merging the data used by Lueth and Ruiz-Arranz (2008) with other bilateral data on remittances from the Inter-American Development Bank and the European Commission, Frankel (2011) finds that bilateral remittances are countercyclical with respect to the home country's economy and procyclical with respect to the host country's GDP. The results of both studies, however, could be severely biased by reverse causality, since, as we have discussed in the Introduction, remittances represent a non negligible share of GDP in many recipient countries.⁶ Lueth and Ruiz-Arranz (2008) mention

⁵By considering a sample of 12 countries, Sayan (2006) highlights also the acyclical behavior of remittances in some of them. The comparison of the results obtained for the whole group and for the single countries translates into a warning against the fact that cross country results might conceal possibly significant differences in the behavior of remittances received by individual countries.

⁶For the same reason, results on specific remittance corridors as well might suffer from reverse causality. Sayan (2004) and Durdu and Sayan (2010) simply investigate cross correlations between remittances from Germany

the problem and maintain that GMM estimates that use lagged values of growth in the recipient countries yield similar results. However, the estimates are not shown and it is not clear whether they actually address the bias. In addition, concerns about the capacity of GMM to address causality are mounting, because of weak instruments and the over-fitting of the endogenous variables (Roodman, 2009; Bazzi and Clemens, 2013). Frankel (2011), on the other hand, simply addresses endogeneity issues concerning the size of migrant stocks and disregards the possible bias related to the receiving country’s GDP. Also, he focuses on the impact of the difference in cyclical position between the sending and the receiving country, whereas bilateral remittances may in fact react differently to business cycle fluctuations in the host and the home country. Reverse causality from receiving country’s GDP to remittance inflows is also likely to affect cross-country aggregate level estimates. The issue is seldom addressed in previous analyses by means of instrumental variables (Singh *et al.*, 2011) or GMM techniques (Cooray and Mallick, 2013).

Recent studies have also investigated whether the sensitivity of remittances to business cycles in the source country may represent an important channel in propagating global shocks (Barajas *et al.*, 2012). By focusing on the effects of the recent global financial crisis on remittances to Africa, Chami *et al.* (2010) predict that African countries with stronger migration ties to Europe (that is, to areas severely hit by recession) would experience larger declines in their GDP owing to the fall in remittance inflows. However, since many African countries receive large transfers from within Africa, they are less exposed to shocks in advanced economies.

3 Remittances from Italy to Developing Countries

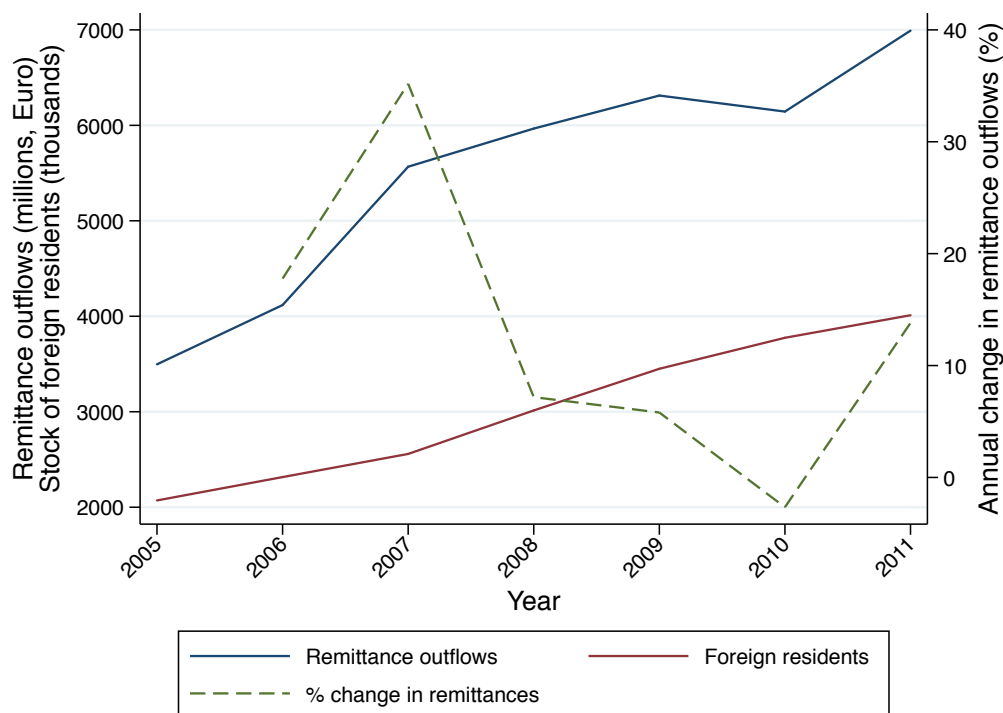
Total remittances from Italy to developing countries doubled between 2005 and 2011, reaching almost € 7 billion, in line with the growth in the stock of foreign residents in Italy (Figure 2). After 2007, however, the growth rate of remittances slowed down significantly, reflecting the impact of the global financial crisis and 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, right panel).

There are significant differences in remittance outflows across Italian regions (Figure 3). Remittances as a share of regional GDP are highest in Latium and Tuscany, reflecting the presence of large number of migrants, in particular from China. Both regions experienced a sizeable increase in remittances between 2005 and 2011. Remittances also rose, albeit less sharply, in Campania, Liguria, Lombardy, and Veneto; here, remittances account for a lower share of regional GDP.

The geographic distribution of remittances from Italy largely mimics the global distribution, suggesting that Italy represents a relevant and representative case study (Figure 4). 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

to Turkey and cyclical fluctuations in Turkish and German GDP without discussing the direction of causality. Akkoyunlu and Kholodilin (2008) while estimating a VAR model find no evidence in favour of Granger causality from remittances from Germany to Turkish GDP.

Figure 2: Remittances outflows to developing countries and foreign residents in Italy



Source: Bank of Italy and ISTAT.

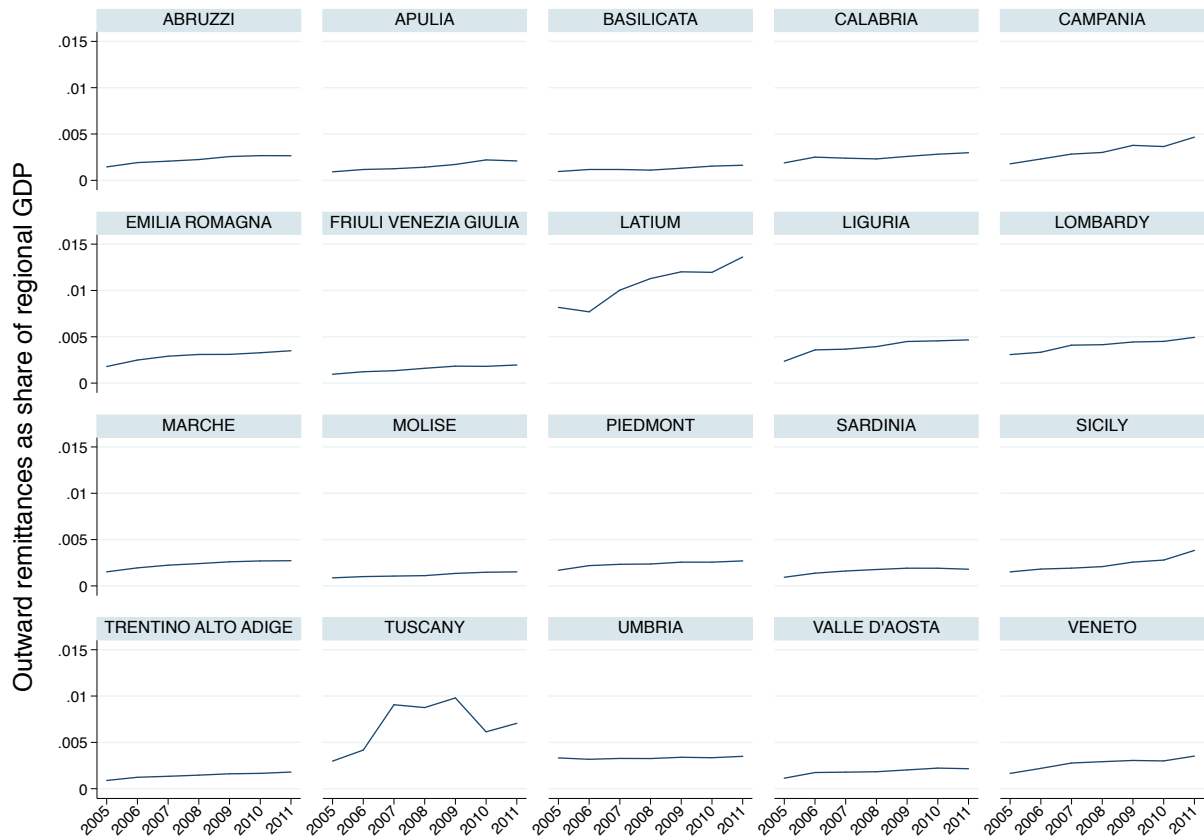
share of global remittances, reflecting the relatively large number of migrants from Eastern Europe in Italy. South Asia accounts for a rising share of remittances from both Italy and the world. In contrast, Sub-Saharan Africa accounts for a limited share of remittances.

Focusing on individual countries, China, Romania, and the Philippines were the major recipients of remittances from Italy in both 2005 and 2011.⁷ 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 2011.⁸

⁷The 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.

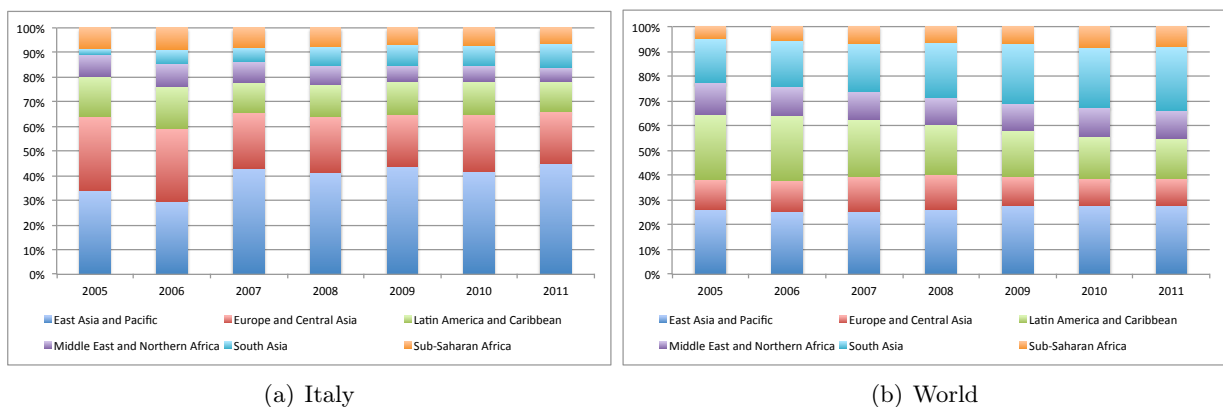
⁸There are some outliers, notably China, whose share of total remittances significantly exceeds its share of total migrants. This may reflect an incorrect classification of some trade payments to China as remittances. When estimating our baseline model, we therefore exclude China. However, when discussing the robustness of the results, we also present estimates including China.

Figure 3: Transfers from Italy by region



Source: Bank of Italy.

Figure 4: Remittances by region of destination



(a) Italy

(b) World

Source: Bank of Italy and World Bank Migration & Remittances Factbook 2011.

4 Empirical Strategy and Data

4.1 The empirical gravity model

We estimate a simple gravity model for bilateral remittances.⁹ The set of independent variables is constructed by exploiting information on both migrants' home countries and Italian provinces, as well as data available at the bilateral (province-country) level. In the baseline specification, the log of bilateral remittances between the source province i and the recipient country j at time t ($REM_{i,j,t}$) is a function of the percentage deviation of GDP per capita from its trend in the source province ($CYCLE_{i,t}$) and in the recipient country ($CYCLE_{j,t}$), the log of trend GDP per capita ($TREND_{i,t}$, $TREND_{j,t}$), the log of the bilateral stocks of migrants ($MIGR_{i,j,t}$), the percentage growth in the bilateral stocks of migrants ($\Delta MIGR_{i,j}$), the distance between province i and country j ($D_{i,j}$), and the log of population levels ($POP_{i,t}$, $POP_{j,t}$):

$$REM_{i,j,t} = \alpha_1 CYCLE_{i,t} + \alpha_2 CYCLE_{j,t} + \alpha_3 TREND_{i,t} + \alpha_4 TREND_{j,t} + \beta_1 MIGR_{i,j,t} + \beta_2 \Delta MIGR_{i,j} + \beta_3 D_{i,j} + \beta_4 POP_{i,t} + \beta_5 POP_{j,t} + \epsilon_{i,j,t} \quad (1)$$

where $\epsilon_{i,j,t}$ is the standard error term. We control for unobservables using country, province, and time fixed effects. The key coefficients of interest are the correlation between remittances and the business cycle in, respectively, the source province, α_1 , and the recipient country, α_2 . Remittances are counter-cyclical with respect to output fluctuations in the recipient country if $\alpha_2 < 0$; this case suggests an altruistic motivations behind transfers. A positive correlation between remittances and the long-run output trend in the recipient country, $\alpha_4 > 0$, instead offers evidence in favour of an investment motive for remittances: investment-driven remittances may be particularly sensitive to long-term prospects. We also expect a positive correlation between remittances and the growth of the migrant stock, $\beta_2 > 0$: fast-expanding communities, with a relatively larger share of recent migrants, will have closer links with their home country, possibly leading to larger altruism-driven remittances.

Since the dependent variable has a significant share of non-randomly distributed zeros (that is, many empty country-province cells), equation 1 is estimated using a Poisson Pseudo-Maximum Likelihood model (Silva and Tenreyro, 2006). The standard practice of estimating gravity models by applying OLS to a log-linearized relation might lead to biased elasticity estimates in the presence of heteroskedasticity; in addition, the use of an OLS estimator would force zero observations in the dependent variable to be either excluded from the sample or transformed by taking $\log(1 + depvar)$. The Poisson Pseudo-Maximum Likelihood estimator is superior to OLS with respect to both drawbacks. We control for the potential correlation of errors within provinces and countries clustering the standard errors by country-province pairs.

This simple model can be augmented to include additional source-province and recipient-country

⁹For a recent and comprehensive review of gravity models, see Anderson (2011).

controls:

$$\begin{aligned}
REM_{i,j,t} = & \alpha_1 CYCLE_{i,t} + \alpha_2 CYCLE_{j,t} + \alpha_3 TREND_{i,t} + \alpha_4 TREND_{j,t} + \\
& \beta_1 MIGR_{i,j,t} + \beta_2 \Delta MIGR_{i,j} + \beta_3 D_{i,j} + \beta_4 POP_{i,t} + \beta_5 POP_{j,t} + \\
& \gamma_1 X_{i,t} + \gamma_2 Z_{j,t} + \epsilon_{i,j,t}
\end{aligned} \tag{2}$$

where $X_{i,t}$ and $Z_{j,t}$ refer respectively to province- and country-level characteristics.

We deepen our analysis of the role of remittances as shock absorbers in recipient countries by including among the country-level characteristics, $Z_{j,t}$, three specific factors of vulnerability for developing countries: an indicator equal to 1 if country j experienced natural disasters in year t ($DIS_{j,t}$); an indicator equal to 1 if armed conflicts occurred in country j at time t ($WAR_{j,t}$); and an indicator equal to 1 if country j experienced a major negative shock to the terms of trade ($TT_{j,t}$), defined as an observation falling in the lowest 5 percent of the distribution of the annual variation in the terms-of-trade index. Adverse shocks in these exogenous variables, controlling for output per capita, may be particularly likely to evoke a sympathetic (or, alternatively, insurance-type) response among migrants.

We also examine the impact of financial development on remittances. First, we consider differences in financial development across recipient countries, as proxied by the logarithm of the share of credit to the private sector over GDP ($FINDEV_{j,t}$). Their effect is a priori ambiguous. On the one hand, countries with more developed credit markets should attract greater remittances, 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: 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).

Second, we consider differences in financial development across Italian provinces, the source of remittances. We expect more developed provincial financial markets to be correlated with greater remittance outflows, for two reasons. Greater provincial banking-sector penetration, as proxied by the number of local bank branches per inhabitant ($BANK_{j,t}$),¹⁰ will reduce the transaction costs associated with remittance transfers, and encourage greater remittances (particularly through the formal sector) (Freund and Spatafora, 2008).¹¹ In addition, the propensity of migrants to remit (again, particularly through formal channels) may depend on the institutional, cultural, and informational gaps between migrants and the host province's financial system (Albareto and Mistrulli, 2011). We proxy these gap using a measure of the functional distance between banks and local economies, based on whether banks are headquartered in the relevant province ($FD_{j,t}$). Intuitively,

¹⁰This is a widely used measure of local financial development; for an application to Italy, see Bonaccorsi di Patti and Gobbi (2001).

¹¹Ideally, we should rely of a more precise measure of transaction costs, such as the service fees charged by banks and money transfer operators for international transfers, as done by Freund and Spatafora (2008). However, those data are not available on at the provincial level and for the time span of our analysis. We rely on bank branches penetration as a proxy for transportation costs and for the level of financial development at the provincial level.

when banks are headquartered in an area, they are better able to collect local information, and as a result are more likely to serve the economic needs of the area (Alessandrini *et al.*, 2009), including the needs of resident migrant workers.

4.2 Data 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 107 developing countries, providing annual data at constant prices for the period 2005-11, compiled by the Bank of Italy.¹² The list of recipient countries included in our sample is provided in Table 2. The dataset covers remittances sent through formal channels, and predominantly reflects 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), represent the stock of foreign resident population in each 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 total growth rate of the number of migrants over 2005-11 in each province as a rough measure of how recently established a migrant community is.

Bilateral distances (in kilometers) between Italian provinces and recipient countries are calculated using the geographical coordinates of the administrative capitals of provinces and nations.

For each recipient country, GDP at constant prices 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*.¹³ Data on armed conflicts are drawn from the UCDP/PRIO Armed Conflict Dataset (Themnér and Wallenstein, 2013).¹⁴ The terms of trade are drawn from the IMF *World Economic Outlook* database.

For each province, real value added for the period 1995-2010 is drawn from ISTAT and the

¹²Data 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.

¹³The 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; 100 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.

¹⁴The most recent version (4-2013) is available at www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/.

Istituto Guglielmo Tagliacarne.¹⁵ The cyclical and trend components are again extracted using the Hodrick-Prescott filter. Data on total provincial population for the period 2005-2011 are provided by ISTAT. The number of bank branches is provided by the Bank of Italy.¹⁶

5 Results

5.1 Remittances as a counter-cyclical financial flow

Remittances increase in response to cyclical output declines in the recipient country, $CYCLE_j$. The response is statistically significant in both the baseline specifications (Table 3) and the full specifications (Tables 4 and 5). The elasticities ranges between 3.5 and 4.7 in the baseline specification. This suggests 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.

Even after controlling for output per capita, remittances increase significantly in response to different factors of vulnerability in recipient countries: the occurrence of natural disasters (Yang, 2008; Mohapatra *et al.*, 2012; Ebeke and Combes, 2013) and a deterioration in the terms of trade (Table 4). Remittances are 4.7 percent larger when recipient countries experienced natural disasters, and 11 percent larger in the case of a significant negative shock to the terms of trade (see column 4).¹⁷ The outbreak of armed conflicts is not associated with a significant impact on remittances, similarly to Naudé and Bezuidenhout (2012).¹⁸ These results are consistent with a particularly altruistic response to major and/or clearly exogenous shocks.

Remittances are also positively and significantly correlated with trend GDP per capita in recipient countries, $TREND_j$, across all specifications. This supports the hypothesis that remittances are at least partly driven by investment motives.

Moreover, remittances seem to be influenced by economic conditions in the migrants' host province, consistent with Barajas *et al.* (2012), although the coefficient on $CYCLE_i$ becomes significant only in the augmented specification (Tables 4 and 5). As discussed, recessions may have a significant impact on relatively low-skilled migrant workers thus reducing their capacity to remit. A one percentage point reduction in provincial GDP relative to its long-term trend, $CYCLE_i$, on average translates into a 1.6 percentage point reduction in transfers from that province. Nevertheless, a twin shock to both source province and recipient country (equal to one standard deviation of, respectively, $CYCLE_j$ and $CYCLE_i$) boosts overall remittances, although the positive effect is small (0.05 percentage points; calculations based on estimates in Table 5, column 4).

¹⁵Data from ISTAT cover the period 1995-2007 while those from *Istituto Guglielmo Tagliacarne* go from 2007 to 2010. The two series hence overlap in two years, highlighting minor differences.

¹⁶Data on the provincial presence of money-transfer operators, which could represent a better measure of the access of migrants to remittance-transfer services, are not publicly available for the period of the analysis.

¹⁷Such effects are computed by means of the following formula: $(\exp(\beta_i) - 1) * 100$, where β_i is the estimated coefficient.

¹⁸These results continue to hold when disasters are expressed in terms of their annual frequency, and when the terms of trade are entered as the total terms-of-trade index. In addition, when armed conflicts are expressed in terms of their annual frequency, they have a significant, positive impact on remittances.

5.2 Remittances and financial development

Remittances are negatively correlated with financial development in recipient countries (Table 5, column 1). On average, a 1 percent reduction in the level of financial development (that is, in the ratio of domestic credit to the private sector over GDP) translates into a 0.9 percent increase in migrants' transfers. This suggests that remittances may help overcome the financing constraints of households living in countries with less efficient financial institutions, in line with [Giuliano and Ruiz-Arranz \(2009\)](#).

In contrast, remittances are positively correlated with financial development in the *source* province. Specifically, remittances increase with the number of bank branches per inhabitant (column 2), and decrease with the functional distance of the provincial banking system from the host province (column 3). All these results continue to hold, and the magnitudes remain relatively unchanged, when controlling jointly for all three measures of source-province and recipient-country financial development (column 4).

In terms of magnitudes, increasing the number of bank branches per inhabitant from the lowest level observed in the dataset (2.13, in Crotona) to the highest level (13.11, in Ascoli Piceno) is associated with a 1.9 percent increase in remittances. Likewise, reducing the functional distance of the banking system from the highest level observed (in Messina) to the lowest level (Bolzano) is associated with a 0.9 percent increase in remittances.¹⁹

5.3 Other results

Bilateral remittances are, not surprisingly, strongly correlated with the size of the relevant migrant community in the relevant province. The elasticity is generally around 0.8, and does not vary significantly across alternative specifications.

Remittances are also positively correlated with the fraction of recent migrants (as proxied by $\Delta MIGR_{i,j}$, the growth rate of the migrant stock over the period 2003-11), with an elasticity of around 1.5. This may reflect either altruism or investment motives. Recent migrants are more likely than older migrants to have strong emotional ties to their home country, including to relatives and friends left behind. They may also need to repay family loans used to defray migration costs. At the same time, recent migrants are more likely to be aware of solid investment opportunities in their home country. They may also be more likely to return, increasing their incentive to invest, for instance in real estate.

The distance to migrants' home country, $DIST_{i,j}$, is positively correlated with remittances, although the effect is typically statistically insignificant. A priori, we would instead expect distance to be positively correlated with remittance transfer costs, and therefore negatively correlated with remittances. 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,

¹⁹These calculations are based on data for 2010 and on the estimation results in Table 5, column 4.

remittance channels.²⁰

The populations of both the host Italian province, POP_i , and the home country, POP_j , are positively correlated with remittances, even after controlling for migrant stocks, indicating the presence of scale effects. Larger host-province populations may reflect better employment opportunities for migrants; larger home-country populations may reflect better investment opportunities for remitters.

5.4 Robustness checks

This section tests the robustness of our findings. We first investigate the impact of changes in the sample composition (Table 6). We then allow for additional covariates (Table 7). Finally, we employ a different estimation method (Tables 8-10).

Different samples The sample underlying our earlier results excludes remittances to China: these appear to be an outlier, possibly reflecting poor data quality (see footnote 8). However, we also estimate the baseline model including China, since this is the largest recipient of remittances from Italy. The earlier results are largely confirmed (Table 6, column 1).

We also split our sample between low- and middle-income countries, to analyze whether the counter-cyclical behavior of remittances depends on the recipient country's income level. However, the coefficient on $CYCLE_j$ remains negative and significant in both samples (columns 2 and 3).

Finally, we drop observations which 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 100 migrants ($MIGR_{ijt} < 100$). Although this threshold reduces the original sample by almost three-quarters, the results from our baseline model remain valid (column 4).²¹ 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)²². Again, our general findings are confirmed.

Additional covariates We next augment our baseline model with a set of additional regressors (Table 7). In the first column we control for foreign aid (measured as aid per capita); similarly to Amuedo-Dorantes *et al.* (2007), we find that aid and remittances are substitutes. More interesting, the coefficient on $CYCLE_j$ is much smaller than in the baseline (Table 3, column 5), suggesting that the role of aid as a shock absorber (Presbitero, 2013) weakens the counter-cyclical

²⁰Also, the variation in $DIST_{i,j}$ is accounted for almost entirely by the variation across countries, rather than across provinces. As a result, $DIST_{i,j}$ may proxy for some omitted variables that explain why several countries are both distant from Italy and significant recipients of remittance. This would bias upwards the coefficient on distance.

²¹Results are robust to alternative specifications of the threshold up to $MIGR_{ijt} < 500$.

²²We drop countries with a total population above the 95th percentile of the sample distribution.

pattern of remittances. In columns 2 to 4 we add, one by one, different measures of macroeconomic stability. We find that remittances are larger in countries with better macroeconomic and institutional conditions. The coefficients on the fiscal balance (as a ratio of GDP) and on the ratio of external debt over GDP are statistically significant and, respectively, positive and negative. The elasticity of remittances to $CYCLE_j$, however, is almost unaffected. The positive coefficient on the variable measuring constraints on the executive indicates that remittances are larger for countries with stronger institutions (Singh *et al.*, 2011). The reduction in the coefficient on $CYCLE_j$ mainly reflects the significant reduction in the sample size, rather than the impact of controlling for institutional quality.

Finally, the negative effect on remittances of the cyclical component of output in recipient countries holds even when controlling jointly for these covariates (column 5).

Different estimator The last robustness exercise relates to the estimation method. Here, we account for the dataset’s panel dimension by means of the Fixed Effects Poisson estimator (Table 8-10). In this case, we cannot identify the effect of variables which vary only across province-country pairs and not over time, such as $D_{i,j}$ and $\Delta MIGR_{i,j}$. Our main results from the baseline and the augmented specification, and in particular the negative coefficient on $CYCLE_j$, are largely confirmed even when including province-country pair fixed effects.

6 Conclusions

This paper examines the role of remittances as a source of external finance that may help mitigate the macroeconomic and external vulnerabilities of developing countries. The global financial crisis and the volatility of commodity prices have hit developing countries severely; increasing their resilience to external shocks is a key objective of international financial institutions and policy-makers. Concessional lending and foreign aid are traditional ways to address vulnerabilities, but their effectiveness is highly disputed. The use of contingent financing instruments has so far been quite limited (International Monetary Fund and World Bank, 2011). Many countries are increasingly relying on international reserves as a stabilization tool, but this imposes high social and economic costs (Rodrik, 2006). Removing barriers to remittances may be a useful complement to such measures.

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 remittances from 103 Italian provinces to 107 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 natural disasters or large declines in the terms of trade. 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.

Remittances are also positively correlated with economic conditions in the source province. Nevertheless, in the presence of similar negative shocks to both source and recipient economies,

remittances remain counter-cyclical with respect to the recipient country. All these results are robust to potential reverse causality from remittances to macroeconomic conditions in the recipient country.

Finally, remittances are positively associated with financial development in the source province, and negatively associated with financial development in the recipient country, even controlling for unobserved provincial and country fixed effects. This suggests that source-province financial development reduces transaction costs and eases access to financial services for migrants, and that remittances help alleviate credit constraints in recipient countries.

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 one way to increase developing countries' resilience to exogenous shocks is to increase their reliance on remittances, rather than on more volatile capital inflows. One way to achieve this is 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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Tables

Table 1: Variables: definition, sources and summary statistics

Variable	Definition	Source	Mean	St. Dev.
REM_{ijt}	Total official remittances at constant prices from province i to country j in year t	Bank of Italy	652969.4	1.14E+07
$CYCLE_{it}$	Logarithm of actual GDP over potential GDP in province i in year t ; potential GDP is calculated by applying the H-P filter to the GDP series at constant prices	ISTAT and Istituto Tagliacarne	0.000	0.029
$CYCLE_{jt}$	Logarithm of actual GDP over potential GDP in country j in year t ; potential GDP is calculated by applying the H-P filter to the GDP series at constant prices	World Economic Outlook (IMF)	0.001	0.031
$TREND_{it}$	Logarithm of potential GDP in province i in year t , calculated by applying the H-P filter to the GDP series at constant prices	ISTAT and Istituto Tagliacarne	9.994	0.251
$TREND_{jt}$	Logarithm of potential GDP in country j in year t , calculated by applying the H-P filter to the GDP series at constant prices	World Economic Outlook (IMF)	10.837	2.493
$MIGR_{ijt}$	Logarithm of the stock of migrants living in province i and coming from country j in year t	ISTAT	3.220	2.096
$\Delta MIGR_{ij}$	Growth rate of the migrant stock MIG_{ij} over 2003-2011	ISTAT	0.037	0.107
WAR_{jt}	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	0.170	0.376
DIS_{jt}	Indicator = 1 if country j experienced natural disasters in year t	EM-DAT, CRED	0.742	0.437
TT_{jt}	Indicator = 1 if country j experienced a large negative shock to the terms of trade, defined as an observation falling in the lowest 5 percent of the distribution of the annual variation in the terms-of-trade index	World Economic Outlook (IMF)	0.048	0.214
$DIST_{ij}$	Logarithm of the kilometeric distance between province i and country j	Built-in STATA routine	8.415	0.764
POP_{it}	Logarithm of population in province i in year t	ISTAT	13.072	0.734
POP_{jt}	Logarithm of population in country j in year t	World Development Indicators	16.554	1.592

(Continued)

Table 1: Continued

Variable	Definition	Source	Mean	St. Dev.
$FINDEV_{jt}$	Logarithm of the ratio of domestic credit to the private sector over GDP in country j in year t	World Development Indicators	3.257	0.798
$BANK_{it}$	Logarithm of the number of bank branches per 10,000 inhabitant in province i in year t	Bank of Italy and IS-TAT	1.744	0.370
FD_{it}	Logarithm of the ratio of the number of branches in province i weighted by the logarithm of 1 plus the kilometeric distance between the province of the branch and the province where the parent bank is headquartered, over total branches in the province i in year t .	Bank of Italy	1.176	0.341
AID_{jt}	Logarithm of official aid per capita received in country j in year t	World Development Indicators	3.296	1.386
$FISC\ BAL_{jt}$	Fiscal balance (+ surplus/ - deficit) as a share of GDP in country j in year t	World Development Indicators	-0.015	0.043
$EXT\ DEBT_{jt}$	External debt stocks as a share of GDP in country j in year t	World Development Indicators	0.465	0.591
$EXEC\ CONST_{jt}$	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	4.733	1.904

Table 2: List of countries

Afghanistan	Gabon	Nepal
Albania	Gambia	Nicaragua
Algeria	Georgia	Niger
Angola	Ghana	Nigeria
Argentina	Guatemala	Pakistan
Armenia	Guinea	Panama
Azerbaijan	Guinea-Bissau	Paraguay
Bangladesh	Haiti	Peru
Belarus	Honduras	Philippines
Benin	India	Romania
Bolivia	Indonesia	Russia
Bosnia and Herzegovina	Iran	Rwanda
Brazil	Iraq	Senegal
Bulgaria	Jamaica	Seychelles
Burkina Faso	Jordan	Sierra Leone
Burundi	Kazakhstan	Somalia
Cambodia	Kenya	South Africa
Cameroon	Korea, North	Sri Lanka
Cape Verde	Kyrgyzstan	Sudan
Central African Rep.	Laos	Syria
Chad	Lebanon	Tanzania
Chile	Liberia	Thailand
China	Libya	Togo
Colombia	Lithuania	Tunisia
Congo	Macedonia	Turkey
Congo, Dem. Rep.	Madagascar	Turkmenistan
Costa Rica	Malaysia	Uganda
Cote d'Ivoire	Mali	Ukraine
Cuba	Mauritania	Uruguay
Dominica	Mauritius	Uzbekistan
Dominican Rep.	Mexico	Venezuela
Ecuador	Moldova	Vietnam
Egypt	Mongolia	Yemen
El Salvador	Morocco	Zambia
Eritrea	Mozambique	Zimbabwe
Ethiopia	Myanmar	

Table 3: Baseline results

	(1)	(2)	(3)	(4)	(5)
CYCLE _{<i>i,t</i>}			1.122 [0.822]	1.258 [0.830]	1.329 [0.830]
CYCLE _{<i>j,t</i>}			-3.510*** [0.639]	-3.491*** [0.649]	-4.699*** [0.615]
TREND _{<i>i,t</i>}					0.286 [0.594]
TREND _{<i>j,t</i>}					3.174*** [0.532]
MIGR _{<i>i,j,t</i>}	0.805*** [0.035]	0.813*** [0.037]	0.814*** [0.037]	0.801*** [0.036]	0.803*** [0.036]
ΔMIGR _{<i>i,j</i>}				1.475*** [0.201]	1.482*** [0.202]
DIST _{<i>i,j</i>}	0.080 [0.197]	0.108 [0.211]	0.110 [0.211]	0.166 [0.191]	0.167 [0.191]
POP _{<i>i,t</i>}		0.288 [0.305]	0.818 [0.650]	0.939 [0.656]	1.099* [0.663]
POP _{<i>j,t</i>}		8.648*** [1.193]	9.373*** [1.304]	9.974*** [1.361]	10.719*** [1.328]
Observations	57,248	48,608	46,760	38,994	38,994
R ²	0.741	0.763	0.771	0.795	0.796

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 Pseudo Maximum Likelihood 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) dummies are included.

Table 4: Extended specification: factors of vulnerability

	(1)	(2)	(3)	(4)
CYCLE _{<i>i,t</i>}	1.316 [0.831]	1.329 [0.830]	1.391 [0.940]	1.359 [0.946]
CYCLE _{<i>j,t</i>}	-4.680*** [0.616]	-4.854*** [0.600]	-2.266*** [0.667]	-2.373*** [0.671]
TREND _{<i>i,t</i>}	0.279 [0.595]	0.259 [0.597]	0.567 [0.576]	0.519 [0.582]
TREND _{<i>j,t</i>}	3.194*** [0.534]	3.247*** [0.536]	1.721*** [0.522]	1.824*** [0.531]
MIGR _{<i>i,j,t</i>}	0.803*** [0.036]	0.805*** [0.036]	0.908*** [0.037]	0.910*** [0.037]
ΔMIGR _{<i>i,j</i>}	1.482*** [0.202]	1.485*** [0.203]	0.852*** [0.132]	0.854*** [0.133]
DIST _{<i>i,j</i>}	0.167 [0.191]	0.168 [0.191]	0.317** [0.153]	0.317** [0.153]
POP _{<i>i,t</i>}	1.088 [0.665]	1.083 [0.662]	1.186 [0.737]	1.139 [0.742]
POP _{<i>j,t</i>}	10.721*** [1.327]	10.743*** [1.362]	5.069*** [1.145]	5.094*** [1.183]
DIS _{<i>j,t</i>}	0.045** [0.019]			0.046** [0.018]
TT _{<i>j,t</i>}		0.094*** [0.033]		0.105*** [0.035]
WAR _{<i>j,t</i>}			-0.046 [0.049]	-0.068 [0.051]
Observations	38,994	36,764	37,414	35,555
R ²	0.795	0.796	0.895	0.896

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 Pseudo Maximum Likelihood estimator (Silva and Tenreiro, 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) dummies are included.

Table 5: Extended specification: the role of financial development

	(1)	(2)	(3)	(4)
CYCLE _{<i>i,t</i>}	1.725** [0.725]	1.491* [0.878]	0.680 [0.643]	1.153* [0.600]
CYCLE _{<i>j,t</i>}	-2.829*** [0.451]	-4.705*** [0.617]	-4.744*** [0.631]	-2.856*** [0.464]
TREND _{<i>i,t</i>}	0.521 [0.545]	0.169 [0.600]	0.129 [0.587]	0.221 [0.528]
TREND _{<i>j,t</i>}	2.986*** [0.518]	3.172*** [0.533]	3.197*** [0.532]	3.007*** [0.521]
MIGR _{<i>i,j,t</i>}	0.807*** [0.035]	0.804*** [0.036]	0.804*** [0.036]	0.808*** [0.035]
ΔMIGR _{<i>i,j</i>}	1.490*** [0.203]	1.486*** [0.204]	1.481*** [0.202]	1.493*** [0.204]
DIST _{<i>i,j</i>}	0.172 [0.192]	0.168 [0.192]	0.164 [0.190]	0.167 [0.190]
POP _{<i>i,t</i>}	1.449** [0.633]	2.071** [0.894]	0.609 [0.530]	1.990*** [0.729]
POP _{<i>j,t</i>}	5.629*** [0.792]	10.662*** [1.305]	10.860*** [1.323]	5.641*** [0.786]
FINDEV _{<i>j,t</i>}	-0.920*** [0.138]			-0.936*** [0.132]
BANK _{<i>i,t</i>}		1.047** [0.429]		1.180*** [0.425]
FD _{<i>i,t</i>}			-0.389** [0.195]	-0.454*** [0.161]
Observations	37,810	38,994	38,994	37,810
R ²	0.807	0.795	0.798	0.810

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 Pseudo Maximum Likelihood 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) dummies are included.

Table 6: Robustness: sample definition

	(1) Including China	(2) Low Income Countries	(3) Middle Income Countries	(4) Large migrant communities	(5) No large recipients
CYCLE _{<i>i,t</i>}	1.043 [1.041]	1.054 [1.319]	1.043 [1.089]	1.492* [0.883]	1.347 [0.901]
CYCLE _{<i>j,t</i>}	-3.055*** [1.035]	-2.182** [1.058]	-3.205*** [1.115]	-5.370*** [0.649]	-4.975*** [0.709]
TREND _{<i>i,t</i>}	-1.021 [0.654]	3.188** [1.553]	-1.211* [0.679]	0.300 [0.631]	0.278 [0.617]
TREND _{<i>j,t</i>}	2.534*** [0.968]	-1.235** [0.622]	2.546*** [0.965]	3.486*** [0.612]	4.110*** [0.579]
MIGR _{<i>i,j,t</i>}	0.783*** [0.078]	0.773*** [0.026]	0.778*** [0.081]	0.824*** [0.043]	0.800*** [0.038]
ΔMIGR _{<i>i,j</i>}	1.983*** [0.423]	0.225 [0.686]	2.017*** [0.431]	1.779*** [0.293]	1.507*** [0.212]
DIST _{<i>i,j</i>}	0.512 [0.394]	0.779 [1.222]	0.511 [0.397]	0.288 [0.197]	0.159 [0.197]
POP _{<i>i,t</i>}	-0.427 [0.836]	2.288** [0.968]	-0.526 [0.877]	1.215* [0.707]	1.158 [0.709]
POP _{<i>j,t</i>}	9.758*** [1.576]	-15.986*** [1.586]	10.264*** [1.724]	11.399*** [1.476]	11.014*** [1.445]
Observations	39,610	8,919	30,943	11,069	36,439
R ²	0.711	0.959	0.717	0.808	0.797

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 Pseudo Maximum Likelihood 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) dummies are included.

Table 7: Robustness: additional covariates

	(1)	(2)	(3)	(4)	(5)
CYCLE _{<i>i,t</i>}	1.308*	1.470	1.437*	1.605	1.594
	[0.733]	[0.901]	[0.802]	[1.110]	[1.540]
CYCLE _{<i>j,t</i>}	-2.398***	-5.765***	-5.186***	-2.728***	-2.437***
	[0.376]	[0.544]	[0.650]	[0.486]	[0.878]
TREND _{<i>i,t</i>}	0.569	-0.067	0.377	1.362*	1.169
	[0.587]	[0.640]	[0.562]	[0.697]	[0.869]
TREND _{<i>j,t</i>}	1.240***	2.407***	2.993***	0.340	1.349**
	[0.456]	[0.878]	[0.585]	[0.563]	[0.618]
MIGR _{<i>i,j,t</i>}	0.915***	0.815***	0.808***	0.750***	0.735***
	[0.036]	[0.040]	[0.036]	[0.023]	[0.033]
ΔMIGR _{<i>i,j</i>}	0.723***	1.491***	1.494***	1.475***	1.234***
	[0.155]	[0.218]	[0.205]	[0.383]	[0.375]
DIST _{<i>i,j</i>}	0.412***	0.053	0.158	0.313***	0.227
	[0.151]	[0.237]	[0.191]	[0.115]	[0.191]
POP _{<i>i,t</i>}	1.296**	1.192	1.229*	1.094	1.711
	[0.630]	[0.784]	[0.669]	[0.958]	[1.189]
POP _{<i>j,t</i>}	2.903***	10.765***	7.861***	1.659*	-4.123**
	[0.921]	[1.653]	[0.982]	[0.861]	[1.737]
AID _{<i>j,t</i>}	-0.115***				-0.243***
	[0.012]				[0.041]
FISC BAL _{<i>j,t</i>}		4.612***			1.633**
		[0.622]			[0.784]
EXT DEBT _{<i>j,t</i>}			-0.628**		-0.223
			[0.268]		[0.219]
EXEC CONST _{<i>j,t</i>}				0.115***	0.252***
				[0.028]	[0.039]
Observations	35,938	26,270	38,079	17,530	10,951
R ²	0.911	0.806	0.800	0.869	0.860

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 Pseudo Maximum Likelihood 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) dummies are included.

Table 8: Robustness: estimation method – baseline results

	(1)	(2)	(3)	(4)	(5)
CYCLE _{<i>i,t</i>}			1.418*	1.522**	1.815**
			[0.743]	[0.742]	[0.771]
CYCLE _{<i>j,t</i>}			-3.043***	-2.977***	-3.829***
			[0.664]	[0.670]	[0.645]
TREND _{<i>i,t</i>}					0.778*
					[0.447]
TREND _{<i>j,t</i>}					2.224***
					[0.460]
MIGR _{<i>i,j,t</i>}	0.086**	0.119**	0.132***	0.105**	0.138***
	[0.035]	[0.050]	[0.050]	[0.045]	[0.045]
POP _{<i>i,t</i>}		0.416	1.082*	1.187**	1.684***
		[0.297]	[0.598]	[0.593]	[0.620]
POP _{<i>j,t</i>}		3.677***	4.320***	4.129***	5.006***
		[1.323]	[1.394]	[1.402]	[1.369]
Observations	55,140	46,286	45,381	38,549	38,549
Number of pair	8,457	8,199	8,044	6,512	6,512

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. Estimations are carried out by using the Fixed effects Poisson 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 set of year (*t*) dummies is included.

Table 9: Robustness: estimation method – factors of vulnerability

	(1)	(2)	(3)	(4)
CYCLE _{<i>i,t</i>}	1.789** [0.773]	1.800** [0.770]	1.707* [0.923]	1.659* [0.930]
CYCLE _{<i>j,t</i>}	-3.798*** [0.645]	-3.924*** [0.635]	-2.492*** [0.666]	-2.563*** [0.672]
TREND _{<i>i,t</i>}	0.768* [0.447]	0.759* [0.446]	0.600 [0.543]	0.555 [0.546]
TREND _{<i>j,t</i>}	2.251*** [0.464]	2.272*** [0.464]	1.849*** [0.500]	1.953*** [0.509]
MIGR _{<i>i,j,t</i>}	0.137*** [0.044]	0.142*** [0.045]	0.493*** [0.122]	0.497*** [0.122]
POP _{<i>i,t</i>}	1.662*** [0.624]	1.663*** [0.620]	1.512** [0.736]	1.453* [0.743]
POP _{<i>j,t</i>}	4.995*** [1.366]	5.072*** [1.400]	4.174*** [1.195]	4.218*** [1.228]
DIS _{<i>j,t</i>}	0.022 [0.019]			0.038** [0.017]
TT _{<i>j,t</i>}		0.090*** [0.033]		0.102*** [0.035]
WAR _{<i>j,t</i>}			-0.068 [0.048]	-0.078 [0.050]
Observations	38,549	36,346	37,019	35,173
Number of pair	6,512	6,139	6,253	5,940

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. Estimations are carried out by using the Fixed effects Poisson 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 set of year (*t*) dummies is included.

Table 10: Robustness: estimation method – the role of financial development

	(1)	(2)	(3)	(4)
CYCLE _{<i>i,t</i>}	2.069*** [0.668]	1.866** [0.803]	1.148** [0.560]	1.432*** [0.512]
CYCLE _{<i>j,t</i>}	-2.364*** [0.463]	-3.838*** [0.649]	-3.873*** [0.659]	-2.415*** [0.481]
TREND _{<i>i,t</i>}	1.063*** [0.401]	0.733 [0.457]	0.634 [0.440]	0.862** [0.392]
TREND _{<i>j,t</i>}	2.138*** [0.457]	2.230*** [0.460]	2.261*** [0.461]	2.187*** [0.458]
MIGR _{<i>i,j,t</i>}	0.179*** [0.045]	0.142*** [0.047]	0.132*** [0.042]	0.178*** [0.045]
POP _{<i>i,t</i>}	1.915*** [0.576]	2.026** [0.839]	1.186*** [0.456]	1.818*** [0.616]
POP _{<i>j,t</i>}	1.271* [0.733]	5.013*** [1.371]	5.033*** [1.295]	1.279* [0.734]
FINDEV _{<i>j,t</i>}	-0.745*** [0.158]			-0.752*** [0.147]
BANK _{<i>i,t</i>}		0.372 [0.354]		0.454 [0.341]
FD _{<i>i,t</i>}			-0.402** [0.188]	-0.427*** [0.152]
Observations	37,305	38,549	38,549	37,305
Number of pair	6,364	6,512	6,512	6,364

Notes: The table reports regression coefficients and (in brackets) the associated robust standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. Estimations are carried out by using the Fixed effects Poisson 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 set of year (*t*) dummies is included.