# Remittances as shock absorbers in developing countries*

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September 2, 2013

PRELIMINARY DRAFT – NOT FOR CITATION – COMMENTS WELCOME

**Abstract**

This paper looks at the correlation between international remittances and the business cycle of destination countries, trying to disentangle between the altruistic and the investment purposes of remittances. To this aim, we will exploit a novel and rich panel data set, covering bilateral remittances from 103 Italian provinces to 155 developing countries over the period 2005-2011. We find that remittances act as an output stabilizer in destination countries and they also increase in response to negative shocks to the terms of trade, to natural disasters and to the outbreak of armed conflicts. This would suggest that remittances could help mitigating developing countries' vulnerability to negative macroeconomic and external shocks.

**JEL Codes:** F33, F34, F35, O11
**Keywords:** Remittances, Shocks, Business Cycle, Vulnerability, Gravity.

*We thank Giacomo Oddo, Roberto Tedeschi and Simonetta Zappa at the Bank of Italy for clarifications on the remittances data set.

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# 1 Introduction

Since the mid-1990s, better macroeconomic management, structural reforms, debt relief and favorable external conditions contributed to strengthen the resilience of developing countries to exogenous shocks. As a result, their vulnerability to growth crises significantly declined over time (Dabla-Norris and Bal-Gunduz, 2012). Nevertheless, the recent global financial crisis, coupled with the food crisis, exposed developed countries to exceptional tail shocks to external demand, declining terms-of-trade, and low government revenue, increasing their external and fiscal vulnerabilities (Figure 1, left panel). In addition, over the past decades developing countries have been increasingly subject to natural disasters, with severe consequences in terms of GDP growth, trade disruptions, and fiscal balances (Raddatz, 2007; Noy, 2009). Thus, the vulnerability of many developing countries to external shocks is again at the center of the policy debate (Schindler, Papageorgiou, Weisfeld, Pattillo, Spatafora, and Berg, 2011).

Against this backdrop, one key policy question concerns the way in which developing countries could mitigate the effects of their dependence on external conditions. In this paper, we focus on capital flows and, in particular, we analyze the role that international remittances can play as a shock absorber in developing countries. The interest in international remittances is justified on different grounds. First, remittances to developing countries have grown steadily relative to capital flows, and they are now the second source of foreign finance for developing countries (Figure 1, right panel). In 2012, remittance flows to the developing world amounted to over USD 400 billion, more than three times the size of official development assistance (The World Bank, 2012) and they are projected to reach USD 534 billion in 2015. Second, remittances have proved very resilient since the onset of the global financial crisis. While private capital flows are typically pro-cyclical, it is often argued that remittances and foreign aid may act as an anti-cyclical shock absorber, helping consumption smoothing in recipient countries during a downturn.[1]

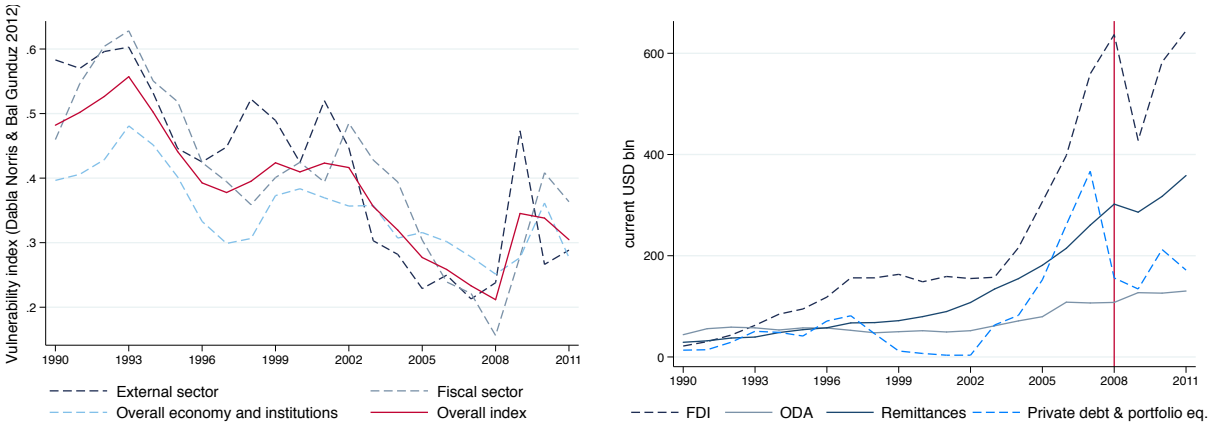
While there is an extensive literature about the drivers and the ciclycality of foreign aid[2] the empirical evidence on the potential role of remittances as a shock absorber is more limited. In theory, remittances may be anti-cyclical with respect to output in the destination country if they were driven by altruistic purposes (Agarwal and Horowitz, 2002; Osili, 2007), or if some household members migrated as part of a risk-diversification strategy aiming to insure against income shocks (Yang and Choi, 2007). However, migrants' decision to remit may also be driven by factors such as investment in physical and human capital (Yang, 2008; Adams Jr. and Cuecuecha, 2010), in which case remittances might be pro-cyclical.

The main aim of this paper is to try to assess to what extent remittances react to the business cycle and to specific characteristics of the destination countries, trying to disentangle between the altruistic and the investment purposes of remittances. This issue has important implications in terms of the potential role of remittances as a tool that helps mitigating developing countries' vulnerability to negative macroeconomic and external shocks.

[1] Combes, Ebeke, Etoundi, and Yogo (2012), for instance, show that aid and remittance flows mitigate the adverse effect of food price shocks on the level and instability of household consumption in vulnerable countries.

[2] For a recent overview, see Dreher, Nunnenkamp, and Thiele (2011) and Presbitero (2013).

Figure 1: Vulnerability and capital flows in low-income countries




(a) Vulnerability Index

(b) Capital flows

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.

To this purpose, we estimate a gravity model for remittances exploiting a novel, extremely rich panel data set, which covers bilateral remittances from 103 Italian provinces to 155 developing countries over the period 2005-2011. In this data set, remittances display significant variability, both over time and across source provinces and destination countries.

More specifically, this paper contributes to the existing literature along four main lines. First, the availability of bilateral data on a very large sample of destinations makes it possible to analyze systematically the correlation between remittance flows and business cycle in the destination country. In contrast, the existing literature focuses mainly on either bilateral remittances for a small sample of countries in Asia and Europe (Lueth and Ruiz-Arranz, 2008; Frankel, 2011), or 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 remittance flows to developing countries and their business cycle.

On a related point, the data on remittances we employ in this study cover the periods before and after the 2007-08 financial crisis, thus allowing an analysis of whether remittances acted as shock absorbers during the global financial crisis. This is of particular interest, since the global crisis affected jointly the migrants' home and host countries, with an uncertain effect on remittances. On the one hand, the dowturn in the home country would induce a positive change in remittances, were they driven by altruistic/insurance purposes. On the other hand, the recession in the host country could reduce the capacity to remit, through a fall in migrants' income, especially if foreign workers are mainly temporary workers, employed either in the construction sector or in the informal sector.

Second, the paper exploits the heterogeneity in origins and destinations of remittance flows to disentangle between remitters' altruistic and investment purposes. To this purpose, we include in our empirical specification both the cyclical and the trend component of per capita GDP of destina-

tion countries. While the former should capture altruistic feelings and hence the role of remittances as shock absorbers, the latter is likely to proxy for investment motives behind remittance, more related to the long-term growth prospects of migrants' countries of origin.

In order to better control for the altruistic motive, we also consider the presence of specific factors of vulnerability for developing countries, i.e. conflicts, disasters and terms of trade. Besides their role in determining the cyclical fluctuations of per capita GDP, such factors may exert a positive direct effect on remittances, in the presence of altruistic feelings.

In addition, we exploit the richness of the data set across Italian provinces to construct proxies for the share of first-generation migrants by country of origin in each Italian province. Should remittances display a stronger negative correlation with the business cycle in the country of destination in those provinces with a relatively younger stock of working-age migrants, this could be read as further evidence of altruistic purposes. Younger migrants, in fact, are likely to have stronger ties to their family back home. By contrast, older migrants have more likely lost many of their family connections to the home country, and their attitude toward remittances may be driven mainly by the intention to invest in the home country.

Third, we contribute to the strand of literature which relates remittances and financial sector development. While there is evidence that remittance flows promote financial development (Gupta, Pattillo, and Wagh, 2009) and that the level of development of the domestic financial system influences the impact of remittances on growth (Giuliano and Ruiz-Arranz, 2009; Bettin and Zazzaro, 2012), the literature has generally focused on financial sector development in recipient countries. Instead, we exploit the cross-sectional dimension of the bilateral data set to test whether the degree of development and proximity of provincial credit markets plays a role in fostering remittances. With the *caveat* that our data include only remittances channelled through the formal sector, we can test whether the share of branches per capita and the presence of banks which are functionally close to the areas where migrants live are positively correlated with the amount of remittances. This would imply that migrants have a better access to formal financial services in areas where banking systems are more developed and functionally closer, since this would reduce informational asimmetries.

Finally, the paper deals with the possible endogeneity of the business cycle in the destination country more satisfactorily than previous studies. Reverse causality from remittances to output may significanly bias the results, since remittances often represent a large share of GDP in developing countries and they have been found to affect output growth and financial development (Gupta, Pattillo, and Wagh, 2009; Giuliano and Ruiz-Arranz, 2009; Bettin and Zazzaro, 2012). However, existing studies avoid this issue, or deal with it relying on lagged values or internal instruments. But this strategy is not likely to fully solve the problem since current remittances could still be driven also by past economic performance. Finding a good instruments for remittances in a cross-country set is quite difficult, since one would need a variable which is related to economic conditions in the destination country, but not with remittances. The structure of our data set makes it possible to circumvent this problem. In fact, considering only remittances from Italian provinces, rather than aggregate remittance inflows, would significantly attenuate the endogeneity of the destination country' business cycle.

By way of preview, our results show that remittances from Italian provinces are negatively correlated with macroeconomic conditions in the destination countries. Remittances act as an output stabilizer in destination countries and they also increase in response to negative shocks to the terms of trade, to natural disasters and to the outbreak of armed conflicts. Remittances are also related to economic conditions in the source country, with potential spillover effects of a local crisis across the migrants' home countries, consistently to what found by Barajas, Chami, Ebeke, and Tapsoba (2012). However, our results imply that, in the occurrence of a twin negative shock in the home and the host country, the former effect dominates. Finally, we find that, even controlling for unobserved provincial and country fixed effects, remittances are larger in provinces where the credit makets are more developed, while they are negatively associated with the level of financial development of destination countries.

The paper is structured as follows: Section 2 offers a detailed review of the existing literature on the macroeconomic determinants of remittance flows, focusing mainly on the way the response to business cycle dynamics in destination countries has been analyzed in previous studies. Section 3 describes the data and the estimated model. Selected statistics about remittances outlows from Italian provinces to developing countries are presented in Section 4. Section 5 discusses the empirical results and Section 6 concludes.

## 2 Remittances' cyclicality: related literature

The empirical literature has investigated the determinants of migrants' remittances at two different levels.

Several microeconomic analyses following the work by Lucas and Stark (1985) tested for the presence of the motives for remitting they had put forward, ranging from pure altruism to pure self-interest.[3] In the presence of altruistic motivation, the hypothesis is that transfers increase to compensate relatives for negative shocks to their income (Agarwal and Horowitz, 2002). If, on the other hand, remittances are driven by self-interest motives such as investment or inheritance, a positive relation with economic conditions of families back home might be expected.[4] Irrespective of the motivation behind the transfers, positive shocks to migrants' income in host countries are likely to translate in larger remittance flows (Bettin, Lucchetti, and Zazzaro, 2012).

At the aggregate level, different macroeconomic factors have been considered as determinants of international remittance flows: exchange rates (Faini, 1994; Higgins, Hysenbegasi, and Pozo, 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, Caglar, and Schiff, 2010), and its interaction with immigration policies (Docquier, Rapoport, and Salomone, 2012).

The way international transfers react to home country's business cycle fluctuations, in particular,

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

[4] Lucas and Stark (1985) and Osili (2007) both show that remittances are positively related to receiving households' income; the same result is provided in de la Briere, Sadoulet, de Janvry, and Lambert (2002) and Hoddinott (1994) by considering household wealth.

can be useful to investigate the prevailing motives for remitting by means of macroeconomic data as well. The evidence gathered so far, however, is far from being conclusive. A negative correlation between remittances and income levels in the home country has been found in many empirical studies (El-Sakka and McNabb, 1999; Bouhga-Hagbe, 2006; Singh, Haacker, Lee, and Le Goff, 2011); similarly, Yang (2008) shows how remittance inflows positively react to natural disasters in developing countries. Such results might support the hypothesis of altruism being the main motivation behind remittances and, as a consequence, an important role of international transfers in mitigating economic hardship in home countries.

Cross-country evidence in favour of profit-driven remittances that are procyclical with respect to the home countries' economic situation is instead provided in Giuliano and Ruiz-Arranz (2009) and Sayan (2006)[5]. In this scenario, investment purposes are likely to be the main driver of migrants' remitting behaviour.

The use of bilateral data, far from contributing to settle the debate on the cyclicality of remittances, has broadened the discussion by considering also the impact of host countries' output fluctuations which could hardly be taken into account when employing large cross-sections of aggregat flows to developing countries.

Time-series analyses which focus on the Germany-Turkey remittance corridor provide conflicting results. While Sayan (2004) and Durdu and Sayan (2010) support a procyclical behaviour with respect to Turkish output and an acyclical behaviour with respect to the German one, a positive elasticity to the German output has been found in Akkoyunlu and Kholodilin (2008) with no significant reaction to the economic situation in Turkey. Empirical studies that look at the U.S.-Mexico corridor essentially agree on the fact that remittances vary countercyclically with Mexico's output but fail to provide any effect of U.S. business cycle in determining cross-border transfers (Durdu and Sayan, 2010; Vargas-Silva, 2008).

A wider geographical perspective has been adopted in a few studies. Lueth and Ruiz-Arranz (2008) use a panel data set on bilateral remittances for 11 European and Asian recipient countries for the period 1980-2004 to estimate a gravity model which includes both home and host country characteristics as explanatory variables. Remittance flows are found to be procyclical and do not increase in response to adverse shocks in the home country. By contrast, by merging the data in Lueth and Ruiz-Arranz (2008) with other bilateral datasets on remittances from the InterAmerican Development Bank and the European Commission, Frankel (2011) find that bilateral remittances are countercyclical with respect to the home country's economy and procyclical with respect to the host country's. The results of both studies, however, could be severely biased by reverse causality, since remittances are a relevant component of GDP in destination countries. While the issue is not discussed by Frankel (2011), Lueth and Ruiz-Arranz (2008) mention the problem and maintain that GMM estimates that use lagged values of growth in the destination countries yiled similar results. However, the estimates are not shown and it is not clear whether they actually address the

[5]By considering a sample of 12 countries, Sayan (2006) highlights also the acyclical behaviour 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.

bias. In addition, concerns about the capacity of GMM to address causality are mounting, because of weak instruments and the overfitting of the endogenous variables (Roodman, 2009; Bazzi and Clemens, 2013).

The sensitivity of international remittances to business cycles may also be interpreted as a further channel of worldwide transmission of macroeconomic shocks in addition to trade and financial openness. Countries that are subject to high external labor mobility are globally integrated, and the remittance flows they receive from their diaspora abroad play an important role in propagating global shocks (Barajas, Chami, Ebeke, and Tapsoba, 2012). By focusing on the effects of the recent global financial crisis on remittances to Africa, Chami, Barajas, Garg, and Fullenkamp (2010) predict that African countries with stronger migration ties to Europe (i.e. to areas severely hit by recession) would experience larger declines in their GDP due to the fall in remittance inflows. However, since many countries receive large transfers from within Africa they are less exposed to global business cycle synchronization. Opposite results are provided by Bugamelli and Paternò (2011) in a cross-country analysis related to the pre-crisis period, that highlights a beneficial effect of remittances in reducing output growth volatility in developing and emerging economies.[6]

# 3 Data and empirical strategy

## 3.1 The empirical model and variables

Our empirical strategy is based on the estimation of a simple gravity model for bilateral remittance flows.[7] As is customary in gravity models, the set of independent variables is constructed by exploiting information on both migrants' home countries and Italian provinces as well as data available at bilateral (province-country) level. In our baseline specification, the log of bilateral remittances between the source province $i$ and the destination country $j$ at time $t$ ($REM_{i,j,t}$) is a function of the log of population levels ($POP_{i,t}$,$POP_{j,t}$), the distance between province $i$ and country $j$ ($D_{i,j}$), the log of the bilateral stocks of migrants ($MIGR_{i,j,t}$), the percentage growth in the bilateral stocks of migrants ($\Delta MIGR_{i,j,t}$), the percentage deviation of GDP per capita from its trend in the source province ($CYCLE_{i,t}$) and in the destination country ($CYCLE_{j,t}$) and the log of the trend of per capita GDP ($TREND_{i,t}$, $TREND_{i,t}$):

$$\begin{aligned} REM_{i,j,t} &= \beta_1 POP_{i,t} + \beta_2 POP_{j,t} + \beta_3 D_{i,j} + \beta_4 MIGR_{i,j,t} + \beta_5 \Delta MIGR_{i,j,t} + \\ &+ \gamma_1 CYCLE_{i,t} + \gamma_2 CYCLE_{j,t} + \gamma_3 TREND_{i,t} + \gamma_4 TREND_{j,t} + \epsilon_{i,j,t} \end{aligned} \quad (1)$$

where $\epsilon_{i,j,t}$ is the standard error term. We control for unobservables using country, province, and time fixed effects. Since the dependent variable has a significant share of non-randomly distributed zeros (that is, many empty country-province cells), equations 1 and 2 will be estimated using a Poisson Pseudo-Maximum Likelihood model (Silva and Tenreyro, 2006). The standard practice to estimate gravity models by applying OLS to a log-linearized relation might lead to biased elasticity

[6] In a previous study, Bugamelli and Paternò (2009) also show that remittances can help dampen the risk of current account reversals.

[7] For a recent and comprehensive review, see Anderson (2011).

estimates in the presence of heteroschedasticity; 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 the $\log(1 + depvar)$. The Poisson Pseudo-Maximum Likelihoo destimator proposed by Silva and Tenreyro (2006) proved superior to OLS with respect to both drawbacks.

The key coefficients of interest are $\gamma_1$ and $\gamma_2$, which measure the correlation between remittances and, respectively, the business cycle in the source province and in the destination country. Specifically, the hypothesis that international remittances act as shock absorbers implies $\gamma_2 < 0$. Such a result would hint at altruistic motivations behind transfers. Additional support in favour of altruism would derive from $\beta_5 > 0$, to the extent that $\Delta MIGR_{i,j,t}$ is able to capture the expansion of ethnic communities due to first-generation migrants. The coefficient $\gamma_4$, whether positive and significantly different from zero, could instead offer some evidence in favour of the investment hypothesis. Profit-driven remittances may be in fact more sensitive to long term prospects in developing countries compared to short-term economic fluctuations.

This simple model can be augmented to include additional country- and province-specific controls:

$$\begin{aligned} REM_{i,j,t} \quad = \quad & \beta_1 POP_{i,t} + \beta_2 POP_{j,t} + \beta_3 D_{i,j} + \beta_4 MIGR_{i,j,t} + \beta_5 \Delta MIGR_{i,j,t} + \\ & + \gamma_1 CYCLE_{i,t} + \gamma_2 CYCLE_{j,t} + \gamma_3 TREND_{i,t} + \gamma_4 TREND_{j,t} + \\ & + \alpha_1 X_{i,t} + \alpha_2 Z_{j,t} + \epsilon_{i,j,t} \end{aligned} \tag{2}$$

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

We start deepening our analysis of the role of remittances as a shock absorber in destination countries by including in $Z_{j,t}$ three specific factors of vulnerability for developing countries: 1) the annual frequency of natural disasters ($DIS_{j,t}$), 2) the occurence of armed conflicts ($WAR_{j,t}$), and 3) the level of the terms of trade ($TT_{j,t}$). If the hypothesis that remittances act as shock absorbers holds true we would expect coefficients related to natural disasters and armed conflicts to be positive and significantly different from zero, while the change on the terms of trade is supposed to be negatively related to international transfers.

Then, we proceed by focusing on the role financial sector development on remittance flows. First, we consider the differences in the level of development of financial systems across destination countries, as proxied by the share of credit to the private sector over GDP ($FINDEV_{j,t}$). On the one hand, countries with more developed credit markets should be more likely to attract remittances. This effect could be the result either of lower transaction costs (Freund and Spatafora, 2008), or of the capacity of an efficient banking system to channel profit-driven remittances towards growth-enhancing projects (Bettin and Zazzaro, 2012). On the other hand, we may expect a negative correlation between financial development and remittances to the extent that remittances act as substitute for the official banking system. Migrants whose relatives have limited access to financial resources at home could send money to relax their liquidity constraints and thus fund either consumption expenditures or investments in physical and human capital (Giuliano and Ruiz-Arranz, 2009).

Second, we exploit the heterogeneity across Italian provinces. In order to proxy for financial

development at the provincial level, we employ two different measures. The first is the number of local bank branches per inhabitant ($BANK_{j,t}$), which has been widely used as a measure of local financial breadth (Bonaccorsi di Patti and Gobbi, 2001, for an application to Italy, see). We expect that branch penetration facilitates remittance flows channelled through the formal financial sector, as showed by Freund and Spatafora (2008). This happens since high transportation costs would induce migrants to use informal channels and would refrain them from sending transfers.[8] However, the propensity of migrants to remit using formal channels may depend also on the informational asymmetries that they may face when dealing with financial institutions. These informational asymmetries are related to institutional and cultural gaps between the migrants' home and host countries (i.e. in our case, Italian provinces) (Albareto and Mistrulli, 2011). We try to measure the extent to which the financial system could bridge the gap with migrants using a measure of functional distance between banks and local economies ($FD_{j,t}$). The rationale is that when banks are functionally close to an area (i.e. they are headquartered there) they are more likely to serve the economic needs of that area and more able to collect local information (Alessandrini, Presbitero, and Zazzaro, 2009). These features of a functionally close credit market would reduce the informational asymmetries with the local community of migrants, possibly facilitating their access to financial services. In sum, more developed local financial markets should be correlated with higher outward transfers, thanks to lower transaction costs.

### 3.2 Data sources

The variables used in equations 1 and 2 are constructed using data collected from many sources. Here we provide an overview, while a precise definition of each variables and of its sources is in Table 5.

The main data source is a large and detailed panel dataset on bilateral outward remittances from 103 Italian provinces to 155 developing countries. The dataset, compiled by the Bank of Italy, includes annual data at constant prices from 2005 to 2011.[9] The data refer to formal channels and predominantly reflect transfers carried out through money transfer operators (MTO) and the postal system. The banking system has been included in the survey only since 2010, and covers between 5 and 10 percent of total transfers. All official transactions are reported, regardless of the amount sent.

Bilateral data on migrant stocks for the period 2005-2011 are collected by the Italian National Institute of Statistics (ISTAT) and represent the stock of foreign resident population in each province, by citizenship, at the beginning of each year. Due to the unavailability of data on the foreign resident population by age structure in each province and on the share of non Italian foreign-born residents, we cannot directly compute the stock of first- versus second-generation migrants, which

[8] Ideally, we should rely of a more precise measure of transaction costs, such as the service fees charged by banks and money tranfer 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.

[9] 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.

would be extremely useful to investigate the importance of altruism in determining remittance behaviour. We simply use the total growth rate of the number of migrants over the period in each province that provides a rough proxy for consolidated versus new communities.

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

For destination countries, we employ data on GDP at constant prices from the IMF World Economic Outlook Database for the period 1950-2012 to derive the cyclical component and the trend of GDP by means of the Hodrick and Prescott (1997) procedure (H-P filter). Data on total population from 2005 to 2011 are drawn from the World Development Indicators Database such as information on the level of financial development, proxied by the domestic credit to private sector (as a share of GDP).

In order to take into account the main factors of vulnerability that may affect destination countries, we employ data on the annual frequency of natural disasters publicly available from the International Emergency Disasters Database (EM-DAT) built by the Centre for Research on the Epidemiology of Disasters (CRED).[10] Data on conflicts are drawn from the UCDP/PRIO Armed Conflict Dataset (Themnér and Wallensteen, 2013).[11] We finally consider data on the terms of trade from the IMF World Economic Outlook Database as a further factor of vulnerability.

Provincial data on real value added are drawn from ISTAT and *Istituto Guglielmo Tagliacarne*.[12] The trend and the cyclical component of real value added for each province are computed by applying the H-P filter to the 1995-2010 series. ISTAT also provides data on total population at the provincial level for the period 2005-2011. Data on bank branches are drawn from the Bank of Italy.[13]

## 4 Some descriptive statistics on Italian remittances

Between 2005 and 2011, transfers from Italy to developing countries have doubled summing up to almost 7 billion Euros in 2011 (Figure 2). After 2007, however, the effects of the global crisis on the Italian economy in terms of weaker output and rising unemployment have dampened remittance outflows; their annual growth rate substantially slowed down from over 35% in 2007 to 6-7% in the two following years. In 2010, transfers decreased by almost 3% with respect to 2009 although they had a quick recovery aftewards (+14% in 2011). Not surprisingly, Figure 2 shows a positive

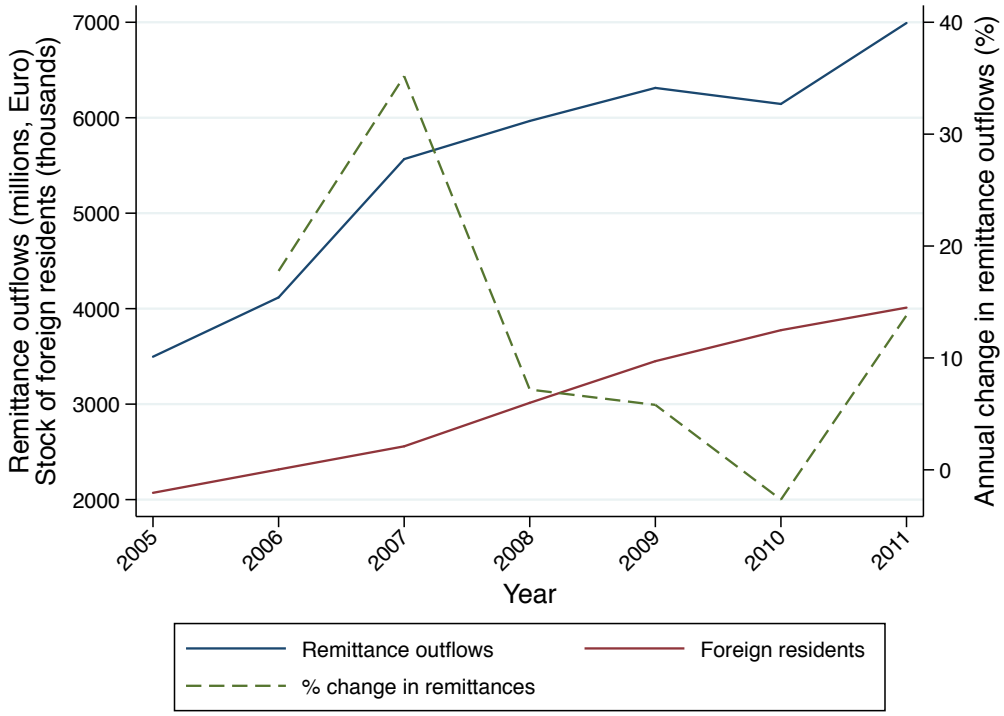
[10] The dataset is accesible at http://www.cred.be/emdat/. In the database, a disaster is defined a "situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance". Formally, an event is classified as a disaster and enters the database 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; call for international assistance. See http://www.emdat.be/criteria-and-definition.

[11] The most recent version (4-2013) is available at http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/.

[12] Data 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.

[13] Given that the availble data on remittances cover flows which ae mainly channeled through MTO, we tried to retrieve data on the provincial presence of money transfers operators, which could be a better proxy for the potential access of migrants to financial services. Unfortunately, we did not have success, since those data are not publicly available for the period of the analysis.

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




Source: Bank of Italy and ISTAT.

correlation between the amount of outward transfers and the stock of foreign residents in Italy.

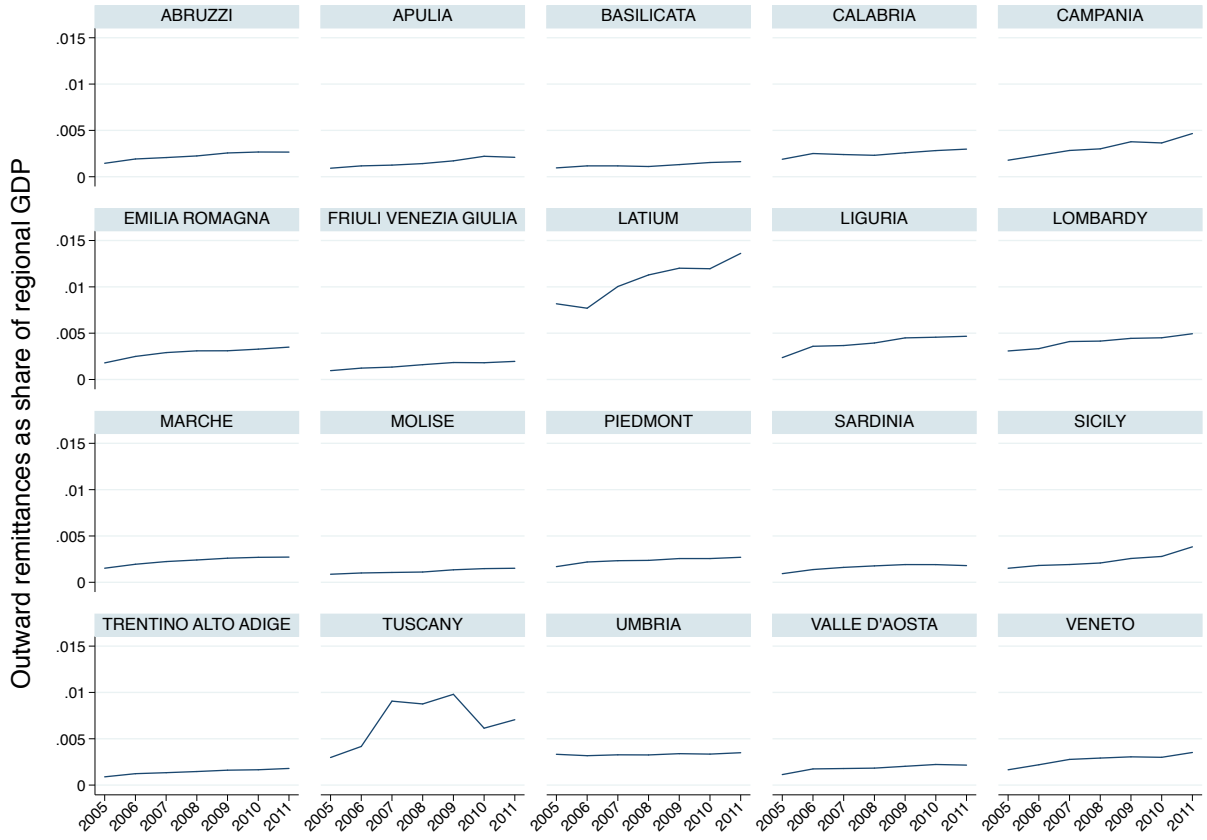
Figure 3 provides evidence of heterogeneous patterns in the size of outward remittances across Italian regions. Latium and Tuscany are the regions generating the most remittances, reflecting the number of migrants—in particular, Chinese migrants—in Rome and Prato, respectively. Both regions experienced a sizeable increase in transfers by their foreign-born residents between 2005 and 2009 followed by a decline in 2010, due to the effect of the crisis on the Italian economy. A positive, although less evident trend can also be detected in Campania, Liguria, Lombardy and Veneto, where remittances represent anyway a much lower share in the regional GDP.

The East Asia and Pacific region is the main destination for both Italian and global remittances towards developing countries (Figure 4). While the region's share of global remittances remained relatively stable over time, its share of Italian remittances increased by 10 percentage points between 2005 and 2011. The large presence of migrants from Eastern Europe in Italy is reflected in the share of remittances destined to Europe and Central Asia which is double the share these countries receive in global remittances. The rising importance of South Asia in attracting migrant transfers from Italy closely mimics the global trend, whereas Sub-Saharan Africa confirms a very limited ability to attract remittances from its diaspora abroad.

Focusing on the 15 major destinations for remittances from Italy as of 2011 (Table 1), China, Romania and the Philippines stood at the top of the rankings, as was also the case in 2005.[14]

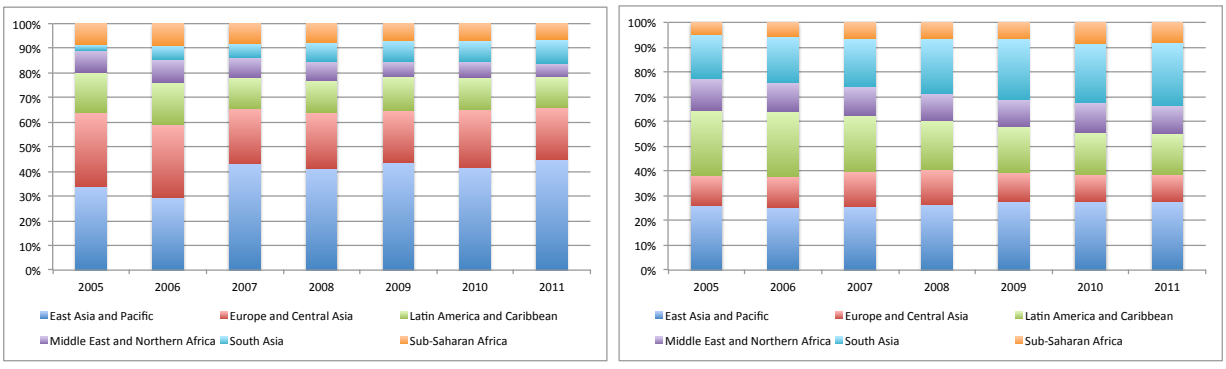
[14]The Italy-China remittance corridor is listed by Eurostat as the top remittance cor-

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.

ridor at the EU level in 2010. The corridors between Italy and both Romania and the Philippines are also mentioned among the ten major corridors from Europe. See

Table 1: Major remittance destinations from Italy: Outflows (Euro mln) and growth rates

| Country of origin | Remittance outflows | | | Resident migrants |
|---|---|---|---|---|
| | 2011 | 2005 | Δ% | 2011 |
| China | 2537.081 | 947.533 | 167.76 | 277,570 |
| Romania | 894.970 | 651.509 | 37.37 | 968,576* |
| Philippines | 601.584 | 245.424 | 145.12 | 152,382 |
| Morocco | 299.898 | 241.967 | 23.94 | 506,369 |
| Bangladesh | 290.472 | 8.593 | 3280.33 | 106,671 |
| Senegal | 245.434 | 157.371 | 55.96 | 87,311 |
| India | 205.626 | 63.049 | 226.14 | 145,164 |
| Peru | 194.009 | 62.824 | 208.81 | 107,847 |
| Brazil | 182.855 | 100.215 | 82.46 | 48,230 |
| Ukraine | 166.371 | 70.144 | 137.18 | 223,782 |
| Ecuador | 155.470 | 80.131 | 94.02 | 89,626 |
| Albania | 131.099 | 119.114 | 10.06 | 491,495 |
| Dominican Rep. | 113.125 | 82.766 | 36.68 | 27,896 |
| Colombia | 96.224 | 144.289 | -33.31 | 21,953 |
| Pakistan | 94.257 | 9.020 | 944.98 | 90,185 |
| Moldova | 91.681 | 45.926 | 99.63 | 147,519 |
| Sri Lanka | 78.248 | 3.716 | 2005.71 | 94,577 |
| Georgia | 70.154 | 4.140 | 1594.54 | 9,467 |
| Tunisia | 67.009 | 55.781 | 20.13 | 122,595 |
| Nigeria | 62.056 | 32.996 | 88.07 | 57,011 |

Source: Bank of Italy and ISTAT. * refers to 2010.

Transfers to Bangladesh, Sri Lanka and Georgia increased dramatically between 2005 and 2011; among the countries listed, Colombia is the only one that registered a decrease in remittances from Italy over the same period. In the last column, Table 1 reports the stock of resident migrants by country of origin at the beginning of 2011. These data are positively correlated with remittance flows to the relevant destination country[15], as already shown in Figure 2 at the aggregate level.

# 5 Results

Results from the baseline and full specifications (equations 1 and 2) are reported in Table 2 and in Tables 3 and 4, respectively.

## 5.1 The gravity model

First of all, we find that remittances from province $i$ to country $j$ are strongly correlated to the size of the migrants' community in the province (Freund and Spatafora, 2008). The elasticity is

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Migrant_remittance_and_cross-border_or_seasonal_compensation_transfer_statistics.

[15]There are some exceptions, notably China, whose share of total remittances is much larger than its share of total migrants. This may reflect an over-estimation of remittances for the Italy-China corridor, owing to trade payments. This concern, explicitly discussed by the Bank of Italy, suggests that dropping China from the empirical analysis may reduce biases due to measurement error.

generally around 0.8 and it does not vary significantly across alternative specifications of equations 1 and 2.

The fraction of young, first-generation migrants (proxied by $\Delta MIGR_{i,j}$, the growth rate of $MIGR_{i,j}$ over the period 2003-2010) is also positively correlated with remittances, with an elasticity coefficient around 1.5.

Such result may support altruistic motivations for remitting but is not completely at odd with the investment hypothesis either. In fact, first-generation young migrants are likely to have stronger emotional ties to their relatives in the country of origin; at the same time, their intention to return (and therefore invest their money at home) might also be stronger compared to older migrants whose ties to the homeland have grown weak over time. In addition, first-generation migrants often need to pay down the loans received from their family to migrate thus having a further motivation to remit which does not hold for the second generations.

Although not significant in most specifications, geographic distance to migrants' home country $DIST_{i,j}$ seems to exert a positive effect on remittance flows. To the extent that distance is able to proxy for transfer costs, we would expect it to be negatively correlated to the size of the transfers. However, this unexpected result might be directly attributed to the nature of remittance data, which take into account only official transactions. The use of official – though expensive – channels is likely to be more popular among long-distance migrants while many people from nearby regions such as Eastern Europe or the Mediterranean region prefer to bring money on their own or give it to friends or relatives travelling home.[16]

The elasticity to the origin country's population $POP_j$ is positive and significant: very populous countries such as India, China, Nigeria and Pakistan are also among the top recipients of officially recorded remittances, reflecting the size of the diaspora.[17] A positive size effect is also associated to the population of Italian provinces $POP_i$.

### 5.2 Remittances as shock absorbers

Moving to our main variable of interest, we find that the coeficient on $CYCLE_j$ is negative and significant as expected both in the baseline and in the full specifications. The elasticity ranges between 3 and 4.7 in the baseline specification but becomes much lower (less than 2) when we single out the terms of trade as a factor of vulnerability for developing countries (Table 3, columns 3-4). As discussed above, the specific structure of our data, which consider only remittances by Italian provinces, makes the potential endogeneity of business cycle a negligible problem, allowing for a more robust inference about the size of the correlation between remittances and economic output in destination countries. Remittances, indeed, seem to respond to altruistic motivations and have a significant role as output stabilizer during downturns; they help consumption smoothing and

[16]Furthermore, the specific structure of our dataset does not allow do correctly identify the effect of distance on bilateral remittances. In fact, the variability of $DIST_{i,j}$ depends almost exclusively on the variability across countries, rather than provinces. This implies that if some countries are, at the same time, far from Italy and strong remitters (as in fact it is, see Table 1), the coefficient of distance is upward biased.

[17]According to the The World Bank (2012), the top recipients of remittances in 2012 are India (70 billion US$), China (66 billion US$), the Philippines (24 billion US$), Mexico (24 billion US$), and Nigeria (21 billion US$). Pakistan received 14 billion US$.

Table 2: Baseline results

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $DIST_{i,j}$ | 0.080 | 0.108 | 0.110 | 0.166 | 0.167 |
| | [0.197] | [0.211] | [0.211] | [0.191] | [0.191] |
| $POP_{i,t}$ | | 0.288 | 0.787 | 0.901 | 1.063* |
| | | [0.305] | [0.629] | [0.636] | [0.642] |
| $POP_{j,t}$ | | 8.648*** | 9.389*** | 9.991*** | 10.752*** |
| | | [1.193] | [1.307] | [1.364] | [1.331] |
| $MIGR_{i,j,t}$ | 0.805*** | 0.813*** | 0.814*** | 0.801*** | 0.803*** |
| | [0.035] | [0.037] | [0.037] | [0.036] | [0.036] |
| $\Delta MIGR_{i,j,t}$ | | | | 1.475*** | 1.482*** |
| | | | | [0.200] | [0.202] |
| $CYCLE_{i,t}$ | | | 1.070 | 1.193 | 1.270 |
| | | | [0.786] | [0.795] | [0.792] |
| $CYCLE_{j,t}$ | | | -3.520*** | -3.500*** | -4.738*** |
| | | | [0.645] | [0.655] | [0.620] |
| $TREND_{i,t}$ | | | | | 0.286 |
| | | | | | [0.602] |
| $TREND_{j,t}$ | | | | | 3.189*** |
| | | | | | [0.531] |
| Observations | 57,248 | 48,608 | 46,760 | 38,994 | 38,994 |
| $R^2$ | 0.741 | 0.763 | 0.771 | 0.795 | 0.795 |

*Notes*: The table reports regression coefficients and (in brackets) the associated robust (?) standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. A constant and a set of province ($i$), country ($j$) and year ($t$) dummies are included.

mitigate the effects of macroeconomic shocks in developing countries.

In addition, remittances significantly increase in response to three different factors of vulnerability developing countries are often exposed to. The occurrence of natural disasters, the outbreak of armed conflicts, and the deterioration of the terms of trade are all associated to significantly larger international tranfers (Table 3).

In the aftermath of a natural disaster, altruistic migrants are likely to increase their transfers to relatives, friends and communities in the country of origin to support them within the reconstruction process by providing some sort of private insurance. Evidence of a positive response of remittances to different types of natural disasters is also provided in Yang (2008) and Mohapatra, Joseph, and Ratha (2012). Along the same line, Ebeke and Combes (2013) show that remittances can play a positive role in mitigating the destabilizing effects on output volatility deriving from natural disasters although, according to their calculation, such role is limited to the interval 8%-17% for remittances' share of GDP.

The effect of the outbreak of an armed conflict in destination countries on received transfers might in principle be ambiguous. One one hand, altruistic remittances are expected to rise due to a general reduction in households' welfare during conflicts. On the other hand, investment-oriented transfers could shrink due to higher risks associated to political and insitutional instability. Differently from Naudé and Bezuidenhout (2012), who find no impact of conflicts' outbreaks on

Table 3: Extended specification: factors of vulnerability

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| $DIST_{i,j}$ | 0.167 | 0.169 | 0.315** | 0.316** |
| | [0.192] | [0.191] | [0.153] | [0.152] |
| $POP_{i,t}$ | 1.131* | 1.234** | 1.217* | 1.388** |
| | [0.626] | [0.617] | [0.699] | [0.694] |
| $POP_{j,t}$ | 10.768*** | 8.972*** | 5.292*** | 4.940*** |
| | [1.299] | [0.888] | [1.107] | [0.905] |
| $MIGR_{i,j,t}$ | 0.804*** | 0.808*** | 0.908*** | 0.911*** |
| | [0.036] | [0.036] | [0.036] | [0.037] |
| $\Delta MIGR_{i,j,t}$ | 1.482*** | 1.491*** | 0.855*** | 0.858*** |
| | [0.202] | [0.204] | [0.133] | [0.134] |
| $CYCLE_{i,t}$ | 1.295* | 1.633** | 1.425* | 1.701** |
| | [0.786] | [0.698] | [0.825] | [0.777] |
| $CYCLE_{j,t}$ | -4.795*** | -3.806*** | -1.862*** | -1.690** |
| | [0.625] | [0.416] | [0.637] | [0.659] |
| $TREND_{i,t}$ | 0.350 | 0.386 | 0.650 | 0.815 |
| | [0.590] | [0.573] | [0.551] | [0.536] |
| $TREND_{j,t}$ | 3.344*** | 3.155*** | 1.370** | 1.683*** |
| | [0.509] | [0.477] | [0.576] | [0.509] |
| $WAR_{j,t}$ | 0.070*** | | | 0.040* |
| | [0.024] | | | [0.022] |
| $DIS_{j,t}$s | | 0.027*** | | 0.017** |
| | | [0.006] | | [0.007] |
| $TT_{j,t}$ | | | -0.005*** | -0.005*** |
| | | | [0.002] | [0.002] |
| Observations | 38,994 | 36,764 | 37,414 | 35,555 |
| $R^2$ | 0.797 | 0.808 | 0.900 | 0.908 |

*Notes*: The table reports regression coefficients and (in brackets) the associated robust (?) standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. A constant and a set of province ($i$), country ($j$) and year ($t$) dummies are included.

remittances to Sub-Saharan Africa, our results offer further support to altruistic purposes behind transfers.

Finally, the altruistic hypothesis is confirmed also by the negative association between terms of trade and remittances. This correlation would suggest that migrants react to a decline in export prices, and henceforth to a reduction of the household income, were their families employed in the export sector, buy increasing their transfers to the home country.

However, our results do not rule out the investment hypothesis, which supported by the fact that the elasticity of remittances to the trend of GDP in destination countries is positive and highly significant across all specifications ($\gamma_4 > 0$).

While so far we have focused on macroeconomic conditions in destination countries, also economic conditions in Italian provinces could play an important role in the volume of outward remittances. In fact, a fall in output in the host country could severey impact foreign workers, especially if they are mainly temporary workers, employed either in the construction sector or in the informal

sector.[18] This would cause a fall in migrants' income, impairing their capacity to remit. Consistently with this hypothesis, the coefficient on $CYCLE_i$ indicates that 1 percentage point deviation of provincial GDP from its long term trend translates on average into a 1.6 percentage point increase in transfers from that province. Akkoyunlu and Kholodilin (2008) also provide evidence of the pro-cyclicality of Turkish remittances with respect to the German output, while Frankel (2011) gets similar results in a cross-country bilateral framework. Barajas, Chami, Ebeke, and Tapsoba (2012) discuss how the sensitivity of remittances to the host countries' economic situation may represent a mechanism of global transmissions of macroeconomic shocks. Our results are consistent with theirs. However, if we consider our baseline estimation in Table 2, column 5 and calculate the effect of a twin shock on both home and host countries (equal to one standard deviation of $CYCLE_{jt}$ and $CYCLE_{it}$, respectively) the boosting effect on remittances deriving from migrants' altruism dominates despite their decreased capacity to remit due to worsening economic and social conditions.

### 5.3 Remittances and financial development

Finally, in Table 4 we report the results of the estimates of the the full specifications, in which we include the measures of financial development at both country and provincial level. Remittances are shown to be negatively correlated with financial development in destination countries (column 1); in line with the evidence provided by Giuliano and Ruiz-Arranz (2009), international transfers provide access to financial resources to migrants' relatives living in countries with less efficient financial institutions, suggesting that remittances may help overcome financing constraints for local households.

As regards the local financial development in the host country, our results indicate that the correlation between remittances the measure of branch breadth is positive (column 2). We also find that the functional proximity of the local banking system to the host province is positively correlated with remittances (column 3). Finally, in column 4 we show that these findings hold even controlling joinly for the three measures of financial development, and elasticities remain almost identical. Thus, transfers are larger the higher the number of bank branches per inhabitant and the lower the functional distance between the banking system and the province. Both features reduce informational asymmetries and transportation costs. Therefore, in more developed credit markets, migrants bear lower transaction costs to access financial services and markets transfers made trough official channels become easier (Freund and Spatafora, 2008).

Moving from Crotone, the province with the lowest number (2.13) of bank branches per inhabitant to Ascoli Piceno, the province with the largest number of bank branches per inhabitant (13.11)[19], remittances would increase, ceteris paribus, by 1.12%. A similar although much smaller effect would be observed when taking functional distance into account. Other things being equal, remittances would rise by 0.65% when moving from the province with the highest value of functional

[18] According to the data published by the Italian National Institute of Statistics (ISTAT), due to the economic slowdown the unemployment rate for foreign-born workers increased from 8.5% in 2008 to 11.6% in 2010. This translated into a drop in outward remittances by around 5% between 2009 and 2010.

[19] We refer to data for 2010 and estimation results in table 4, column 4.

Table 4: Extended specification: the role of financial development

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| $DIST_{i,j}$ | 0.164 | 0.168 | 0.165 | 0.164 |
| | [0.191] | [0.192] | [0.190] | [0.190] |
| $MIGR_{i,j,t}$ | 0.805*** | 0.804*** | 0.804*** | 0.806*** |
| | [0.035] | [0.036] | [0.036] | [0.036] |
| $POP_{i,t}$ | 1.366** | 1.840** | 0.636 | 1.639** |
| | [0.613] | [0.839] | [0.531] | [0.679] |
| $POP_{j,t}$ | 5.488*** | 10.704*** | 10.874*** | 5.503*** |
| | [0.808] | [1.310] | [1.319] | [0.827] |
| $CYCLE_{i,t}$ | 1.602** | 1.363* | 0.691 | 1.033* |
| | [0.696] | [0.822] | [0.632] | [0.563] |
| $CYCLE_{j,t}$ | -3.081*** | -4.732*** | -4.780*** | -3.181*** |
| | [0.442] | [0.620] | [0.635] | [0.483] |
| $\Delta MIGR_{i,j,t}$ | 1.489*** | 1.486*** | 1.481*** | 1.498*** |
| | [0.204] | [0.203] | [0.202] | [0.207] |
| $TREND_{i,t}$ | 0.554 | 0.239 | 0.173 | 0.406 |
| | [0.566] | [0.602] | [0.588] | [0.551] |
| $TREND_{j,t}$ | 2.763*** | 3.181*** | 3.214*** | 2.750*** |
| | [0.491] | [0.531] | [0.530] | [0.489] |
| $FINDEV_{j,t}$ | -2.375*** | | | -2.383*** |
| | [0.416] | | | [0.388] |
| $BANK_{i,t}$ | | 0.116** | | 0.102** |
| | | [0.056] | | [0.051] |
| $FD_{i,t}$ | | | -0.131** | -0.127*** |
| | | | [0.067] | [0.049] |
| Observations | 37,810 | 38,994 | 38,994 | 37,810 |
| $R^2$ | 0.804 | 0.795 | 0.798 | 0.808 |

*Notes*: The table reports regression coefficients and (in brackets) the associated robust (?) standard errors. * significant at 10%; ** significant at 5%; *** significant at 1%. A constant and a set of province ($i$), country ($j$) and year ($t$) dummies are included.

distance in the sample (Messina) to the province with the lowest one (Bolzano).

### 5.4 Robustness checks

In this section we describe the results of some additional exercises which we have run to test the robustness of our findings. ... *TO BE COMPLETED* ...

## 6 Conclusions

The ongoing global financial crisis and the volatility of commodity prices severely hit developing countries, which are vulnerable to macroeconomic and external shocks. How to increase the resilience to external shocks is a key issue for international financial institutions and policy makers. Concessional lending and foreign aid are the traditional way to address balce of payment crises, but their effectiveness is highly disputed. The use of contingent financing instruments has been so

far quite limited (International Monetary Fund and World Bank, 2011). Many countries, instead, are increasingly relying on international reserves as a stabilization tool, but this generally imposes high social and economic costs (Rodrik, 2006). In this paper we focus on the role of remittances as a market-driven source of external finance which may mitigate the vulnerability of developing countries.

Using a large dataset of bilateral remittance flows from Italian provinces to 155 developing countries, we inspect how remittances reacts to macroeconomic conditions and exogenous shock in destination countries. We find that migrants' altruistic purposes seems to be a main driver of international transfers. In fact, remittances are negatively correlated to the business cycle in destination countries and they significantly increase in response to natural disasters, the outbreak of armed conflicts and negative shocks in the terms of trade. Our results are robust to a possible reverse causality running from remittances to macroeconomic conditions in the destination country.

However, we our results provides also some support in favour of the investment motive to remit. Remittances are shown to be positively correlated to the potential GDP of destination countries, thus hinting at the role that long term economic prospects play in attracting capital flows from the diaspora abroad.

Finally, we focus on the role of financial sector development, finding that remittances are larger when migrants come from less developed financial markets and when they migrate to more financially developed provinces. This evidence is consistent with remittances alleviating credit constraints in destination countries and with financial development lowering transaction costs and easing access to financial services for migrants in the host country.

While the data set employed in our analysis presents several advantages in terms of country coverage and because of the recording of any transaction, irrespective of the amout, in interpreting our findings, an important *caveat* concern the measure of remittances, which include exclusively the transfers channelled via the formal sector and recorded by the Bank of Italy. Further research on informal remittances – at the micro level – and on a larger sample of host countries – at the macro level – is required to fully understand whether remittances could actually work as a stabilization tool. Nevertheless, our findings on the effect of remittances on macroeconomic stability add to the literature about the positive impact on remittances on poverty alleviation and growth in destination countries, and corroborate the efforts done by international financial institutions and the private sector to foster remittances.

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# Additional Tables

Table 5: Variables: definition and sources

| Variables | Definition | Source |
|---|---|---|
| $REM_{ij}$ | Total official remittances at constant prices from province $i$ to country $j$ | Bank of Italy |
| $POP$ | Logarithm of population | World Development Indicators, for countries ($j$); ISTAT for provinces ($i$) |
| $CYCLE$ | Deviation of actual GDP from potential GDP, expressed as share of potential GDP; potential GDP iscalculated by applying the H-P filter at the GDP series at constant prices | World Economic Outlook (IMF), forcountries ($j$); ISTAT and Istituto Tagliacarne for provinces ($i$) |
| $TREND$ | Logarithm of potential GDP, calculated by applying the H-P filter at the GDP series at constant prices | World Economic Outlook (IMF), for countries ($j$); ISTAT and Istituto Tagliacarne for provinces ($i$) |
| $MIG_{ij}$ | Logarithm of the stock of migrants living in province $i$ and coming from counry $j$ | ISTAT |
| $\Delta MIG_{ij}$ | Growth rate of the migrant stock $MIG_{ij}$ over 2003-2011 | ISTAT |
| $DIST_{ij}$ | Logarithm of the kilometric distance between provice $i$ and country $j$ | Built-in STATA routine |
| $WAR_j$ | Number of armed conflicts in country $j$ 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 |
| $DIS_j$ | Frequency of natural disasters in country $j$ calculated as the total number of natural disaster events in thecountry in a given year | EM-DAT, CRED |
| $TT_j$ | Level of the terms of trade, in country $j$ | World Economic Outlook (IMF) |
| $FINDEV_j$ | Ratio of domestic credit to the private sector over GDP in country $j$ | World Development Indicators |
| $BANK_i$ | Number of bank branches per 10,000 inhabitant in province $i$ | Bank of Italy and ISTAT |
| $FD_i$ | Ratio of the number of branches in province $i$ weighted by the logarithm of 1 plus the kilometric distance between the province of the branch and the province where the parent bank is headquartered, over total branches in the province $i$. | Bank of Italy |