HOMEWARD BOUND FDI: ARE MIGRANTS A BRIDGE OVER TROUBLED FINANCE?

Cuadros, A., Martín-Montaner, J. and Paniagua, J.

Preliminary draft, please do not quote

This version, 4th August 2014

Abstract

Information barriers have been at the core of the debate on international capital flows. Foreign Direct Investment (FDI) has been substantially more sensitive to information frictions than investment in portfolio equity and debt securities (Daude and Fratzscher, 2008). Migrants can lower these barriers providing information to investors about their country or origin as well as reducing transactions costs by sharing their expertise about regulation, customs and procedures. In fact, the potential impact of migrants on FDI is expected to be higher than on trade (see Tong, 2006 and Kugler and Rapoport, 2011). This paper shed new light into the role played by migrants as a driver of FDI flows. Unlike most existing studies, which take total capital flows as the main dependent variable, we focus on both the number of investments abroad and the scale of the projects undertaken (extensive and intensive margins, respectively). Moreover, we consider migrants as financial entrepreneurs that may ease credit constraints faced by foreign investors after the 2007 financial crisis. Our findings for a large number of developed and developing countries during the period 2003-2012 support that the impact of immigrants comes mainly through their influence on the number of outward FDI projects undertaken (extensive margin). Also, our results shed new light regarding the role played by migrant as financial entrepreneurs who may ease the access to credit through their networks.

JEL Classification: F22, F23, F16

Keywords: migration, FDI, foreign employment, financial constraints.

Acknowledgments:

Authors gratefully acknowledge financial support from the Spanish Ministerio de Economía y Competitividad and FEDER (ECO2011-28155), the Spanish Ministerio de Educación (ECO2011-27619) and the Pla de Promoció de la Investigació de la Universitat Jaume I (P1.1B2013-22).
1. Introduction

An extensive body of research has documented a positive association between ethnic networks and international trade since the seminar work of Gould (1994). Most of this literature has focused on the so-called network channel, that is, the fact that migrants display useful knowledge about their home countries which helps exporters to reduce transaction costs and therefore enhances bilateral trade.

However, the link between migrants and Foreign Direct Investment (FDI) remains relatively unexplored. This is surprising as FDI activities face larger information asymmetries than international trade transactions, thus we would expect networks to play a more important role in bilateral FDI than in trade (see Tong, 2006). Kugler and Rapoport (2011) support this hypothesis by investigating the relationship between trade, migration and FDI. These authors conclude that, to the extent that international transactions are facilitated by the information transmitted by migrants, the impact is stronger on FDI than on trade. The influence of cultural factors on FDI seems to be also particularly likely as this exchange no only involves a transfer of foreign capital but also a lasting interest in an acquired company (see Bandelj, 2002). As emphasized by Javorcik et al (2011), FDI implies a long-term investment and therefore requires a wider variety of information about the market, legal framework, and business structure in the host country. This long-term nature explains why some authors consider FDI flows to be more sensitive to information frictions than investment portfolio equity and debt securities (Daude and Fratzscher, 2008). In fact, new approaches in the literature stress that uncertainty is an important barrier to multinational corporations’ investment and suggest a complementary relationship between capital and labor flows (Buch et al, 2006).

Unlike most previous studies, that take total capital flows as their main dependent variable, we focus on both the scale as well as the number of FDI projects undertaken (intensive and extensive margins, respectively). Under this perspective we assume, on the one hand, that the effect of migrants on these two variables may be different. This could happen if, for example, the information provided by migrants affect the number of investment projects but not the total amount of investment. In this sense, migrants may act as transnational entrepreneurs acting as business people who create new economic opportunities in the host economy. This can happen through the existence of personal ties between expatriates and business members of host countries that can influence investment decisions as affiliates to host locations facilitate information flows and/or lobby for certain locations as opposed to others (see Bandelj, 2002). In other words, foreign employees may act as knowledge brokers that transfer knowledge from where it is known to where it is not (Paniagua and Sapena, 2013 and Bergstrand et al, 2008). On the other hand and, taking into account the likely potential impact of financial constraints on potential entrepreneurs (Alfaro, 2004), we examining the role played by
migrants in easing credit constraints faced by foreign investors after the 2007 financial crisis. Migrants can act as financial entrepreneurs by easing the access to credit through their networks. Thus, when the traditional credit channels fail, financial entrepreneurs step in to provide the credit not provided by the banking system. Moreover, as stated by Gil Pareja et al (2013), credit constraints derived from system banking crises affect primarily FDI’s extensive margin.

Although the above arguments seem be applicable mainly to skilled workers, there other channels through which unskilled workers may also contribute to relax information constraints on FDI. As an example, participation in the destination country’s labor force may reveal information about the characteristics of workers in migrant home country, providing valuable information for FDI projects. Therefore, both skilled and unskilled migration can provide information to facilitate FDI (see Kugler and Rapoport, 2011).

The reminder of this paper is as follows. Section 2 reviews the relevant literature. Section 3 presents the theoretical model. Section 4 presents the empirical methodology and data. Section 5 describes the results and Section 6 concludes.

2. Related literature/Migration FDI literature

New approaches in the literature stress that uncertainty as well as information are important barriers to both trade and multinational corporations’ investment and suggest a complementary relationship between trade, capital and labor flows (see Kugler and Rapoport, 2011 and Buch et al, 2006). These approaches, based on the theory of networks, suggest that both emigrants and immigrants are expected to have positive and significant effects on bilateral trade and FDI flows. However, whereas the relationship between migration and trade has been extensively analyzed, the FDI-migration link remains relatively unexplored.

FDI and migration may interact in many ways. Acting as an “information revealing” network, migrant workers may stimulate FDI inflows in their origin country. This could happen, for example, when people living abroad demand products or services from their home country and companies who identify these needs try to satisfy them by investing abroad. Emigrants can also broaden their knowledge and skills through working abroad and acquire capacities to realize business activities in their home country (Brain gain). In fact, by acquiring skills during their stay abroad, returning migrants may contribute to the spread of technological progress in their home country (see Federici and Giannetti, 2010). Thus, it is also reasonable to expect that economic performance of host countries may improve through the presence of multinational enterprises and the new technology and know-how that they may bring with them, which may lower the

1 These authors support the hypothesis that the brain drain associated with migration does not always apply.

incentives to migrate. The company may also bring its executives from the home country to ensure that the subsidiary maintains quality and product standards or it may employ countrymen living or lived abroad. This practice would cause a migration towards the host country of FDI.

In fact, quite a few studies provide evidence in favor of the hypothesis that capital and labor often move in the same direction. Most of them are individual case studies that analyze both inward and outward FDI and concentrate mainly on immigrant’s networks. The United States experience has been widely analyzed. Results obtained by Javorcik et al (2011) indicate that outward US FDI is positively related with the presence of migrants in the United States, being this relationship stronger for migrants with tertiary education. Kugler and Rapoport (2007) report a contemporaneous substitutability but a dynamic complementarity between immigration and outward FDI in this country. Thus, immigrants provide information about future investment opportunities in their country of origin. More recently, Bhattacharya et al (2008) find that the size of the immigrants group from a country living in the US is positively related with US investment in that country. Foad (2012) adopts a regional perspective and looks at the regional distribution of both FDI and immigration from 10 source countries to the 50 US states. The results of this paper indicate that the presence of an immigrant community leads to new FDI from those immigrants native countries.

The Chinese case has also received attention by some empirical studies. That is the case of Tong (2005) that accounts by the Chinese networks by the product of the number of Ethnic Chines in the source and the host countries and report evidence about a significant positive influence of these networks on bilateral FDI. Similarly, Gao (2003) finds a positive impact of ethnic Chinese networks (defined as the population share of ethnic Chinese in the investing country) and inward FDI.

Other countries experiences have also been analyzed. That is the case of Buch et al (2006) concluding that there are higher stocks of inward FDI in German states hosting a large foreign population from the same country of origin. Gheasi et al (2013) show that UK investment abroad is positively related to the presence of immigrants. Finally, Murat and Pistoressi (2009) report that networks of Italian emigrants abroad promote both inward and outward FDI although the evidence for immigrants is weaker. According to these authors, the significant impact or Italian “diasporas” may be explained by the small average size of the Italian firms which makes them particularly dependent on personal contacts for their transactions and investment abroad.

To the best of our knowledge, the number of multicountry approaches is considerably smaller. Docquier and Lodigiani (2010) report strong networks externalities for a sample of 150 countries during the period 1980-2000, mainly associated with the skilled diaspora. These authors do not use bilateral data but aggregate stock of FDI-funded capital received by world countries. Flisi and Murat (2011) study the relationship between bilateral FDIs and immigrant networks in France, Germany, UK, Italy and
Spain and the emigrant Diaspora just for Italy and Spain. Their findings indicate that FDI in UK, Germany and France are prompted by the ties of skilled immigrants, while those of Italy and Spain are only influenced by their respective emigrant Diaspora (although they cannot separate skilled and unskilled workers within the diaspora). In these two last countries, immigrants have weak or nil effect. According to the authors, this disparity may arise from the past history of international migration in the two groups of countries: one more based on colonialism, the other on labor migration. Also, because (unlike France, Germany and UK) Italy and Spain have built and still maintain close links with their emigrant diasporas. Kugler and Rapoport (2011) find that migration positively affects both trade and FDI (at both the extensive and intensive margins), but the impact on the latter is higher. Their analyses cover a sample of 203 countries for the average period 2001-2006. Ivels and De Mello (2010) also analyze trade, FDI and migration in a unified framework from the perspective of migration-sending countries. Their results indicate that if exports are low-skill intensive, emigration of high-skill labor leads to positive FDI.

Most of the above referred studies do not identify the specific channels through which the information carried by migrants helps to lead more FDI to their countries of origin. Recent research, however, has highlighted the role of immigrants as business developers (Foley and Kerr, 2013), that is, individuals of a certain ethnicity that possess specific knowledge about how to conduct business in countries associated with that ethnicity. Under this approach, the particularities of the entrepreneur reside in ethnic resources. It is the access to this type of resources that allows the entrepreneur to initiate, finance and develop their business. The relations of trust and friendship that entrepreneurs maintain with others from the same ethnic background through social networks are the origin of such resources (see Rueda-Armengot and Peris-Ortiz, 2012), which can be materialized not only in or intangible aspects (information, orientation, advice) but also in tangible ones such as financing. In fact, if migrants integrate into a business community, a network can emerge whereby migrants liaise between potential investors and partners (Kugler and Rapoport, 2011). We are interested in this latter aspect, as allows relating migrant networks to a key issue for potential foreign investors: access to financial markets in the host country.

Financial markets are crucial for FDI flows: deep financial markets provide firms’ access to the capital needed to undertake investment projects (Di Giovanni, 2005). Conversely, its absence may constraint potential entrepreneurs, as stressed by Alfaro et al. (2004). In this sense, Kroszner et al. (2007) achieve two important results: first, value added in those sectors with higher dependence of external finance contracts during a banking crisis; second, those contractions are substantially greater in countries with more evolved financial markets. Bruch et al. (2014) achieve similar results:

---

3 See also the work by Saxenian (2002) on American transnational entrepreneurs.
financial constraints affect more deeply larger and/or more productive firms which are more likely to engage into FDI decisions. Consequently, access to external finance can be a crucial determinant of business expansion. As highlighted by Héricourt and Poncet (2009), the development of cross-border relationships between Chinese and foreign firm helps private domestic firms to bypass both the financial and legal obstacles that they face at home. Foreign firms are expected to face a lower degree of financial constraints compared with their domestic counterparts (Guariglia and Mateut, 2010).

The purpose of the present research is to link, if possible, the two bodies of literature reviewed in the paragraphs above. First, we take as a starting point the high sensitivity of FDI to information costs and examine the role played by migrant networks in easing them. Second, we analyse whether access to credit markets is one of the channels through which the previous mechanism works. In fact, migrants could find interesting to help inward FDI in their countries of origin. Harrison et al. (2004) found that FDI inflows reduce financial constraints of domestic owned enterprises, so that their investments become less sensible to cash. Besides these effects appear to be stronger for low-income (and, therefore, more likely origin of migration flows) than for high-income regions.

In order to motivate this strategy, we must take into account that the credit constraints following the financial crisis of 2007 constitute a particularly relevant environment for our analysis. Thus, Campello et al. (2010) observe that the systemic banking crisis since 2007 forced most of the financially constrained firms to drop investment projects (whereas unconstrained firms didn’t). Prior to the crisis, Alba et al. (2007), focusing on the case of Japanese FDI into the U.S., had already found that multiple rating downgrades of Japanese banks significantly affects the rate of FDI in those firms which have the downgraded banks as their main financial source. Through the consideration of the credit shortage that have followed the financial crisis of 2007, we may wonder whether the effectiveness of migrant networks in promoting FDI been conditioned by these constraints.

3. The model

The model considers a firm producing and selling products in country \( i \). The revenue to be a strictly increasing and concave function of the quantity produced in that country \( x_i \). The concavity in the revenue function may stem from technology, or market preferences. The quantity produced is, therefore, assumed to be a CES Cobb-Douglas type:

\[
x_i = \left( \frac{K}{(1 + r_i)} \right)^\mu \left( \frac{L}{w_i} \right)^{(1-\mu)},
\]

[1]
where L is labor; K is the capital stock, \( w_i \) are the wages a \( i \) and \( r_i \) the interest rate and \( \mu \in (0,1) \) is sector wide parameter that describes the intensity in which each factor is used in the production of \( x_i \).

In this setup, the maximization function faced by the enterprise is given by:

\[
\pi^i = \max \left\{ p_i \left( \frac{K}{(1 + r_i)} \right)^\mu \left( \frac{L}{w_i} \right)^{(1-\mu)} - f \right\}, \tag{2}
\]

where \( p_i \) are the prices at which it sells at country \( i \) and \( f \) is a fixed cost of production.

**Foreign production**

Consider now that the firm plans to setup a similar plant in country \( j \). We assume that the company uses credit channels (formal and informal) at the home country to finance its foreign operations. Financial frictions occur as a problem of limited commitment (Antrás & Foley, forthcoming; Paniagua & Sapena, 2014a; Thomas & Worrall, 1994). As a result of systemic banking crises domestic banks at country \( i \) may not abide fully by the financial contract. When the contract is not enforced, the bank does not stand by the initial terms of the contract with the firm. In particular, the contract is enforced with probability \( \gamma_i \in (0,1) \), where \( \gamma_i \) is an index of the financial quality of country \( i \).

For simplicity, we assume a horizontal integration of the MNE, that is, the fixed costs from this new facility are the same that the existing plant with \( f_i = f_j = f \). The expected revenue will diminish by a fraction \( \delta \in (0,1) \) which captures the extent of banking contractual frictions. However, in this case the MNE can procure capital outside the banking system independently from the systemic banking shocks. We assume that its ability to do so depends on the immigrant network of the host country \( j \) present in the source country \( i \). When the traditional credit channels fail, financial entrepreneurs step in to provide the credit that banks do not provide (Alfaro, Chanda, Kalemlı-Ozcan, & Sayek, 2004). These migrant financial networks may also contribute with knowledge of the host country preferences, financial or legal system.

Therefore the production constraint of the MNE results in:

\[
\text{FDI}_{ij} \leq (\gamma_i + (1 - \gamma_i)\delta) \left( \frac{\lambda_{ij}K}{(1 + r_i)} \right)^\mu \left( \frac{L}{w_i} \right)^{(1-\mu)}, \tag{3}
\]

where \( \lambda_{ij} \) represents the extent by which the MNE may procure capital outside the banking system. Equation [3] reads that with a probability \( (1 - \gamma_i) \), the bank is not abiding by the contract with the MNE and expected employment is reduced by \( \delta \). However, for capital intensive plants \( (\mu = 1) \), credit constraints are offset by migrant financial networks outside the banking system. The model does not delve into the ways the immigrants secure the credit, they may do so through their savings or via credit from their country of origin \( (j) \), when source and host country do not suffer from
contemporaneous banking crises. In this last case, immigrants act as financial and knowledge brokers between both parties (Paniagua & Sapena, 2013).

The expected revenue of the MNE in the host country results in:

$$\pi^*_i = \max \left\{ (\gamma_i + (1 - \gamma_i)\delta) p_j \left( \lambda_{ij} K / (1 + r_i) \right)^\mu \left( l_i / w_i \right)^{(1-\mu)} - f \right\}$$  \[4\]

Applying the envelope theorem to expressions [2] and [4], the MNE prefers investing in country j over domestic production if and only if

$$(\gamma_i + (1 - \gamma_i)\delta) \left( p_j / p_i \right) \lambda_{ij}^\mu > \left( w_j / w_i \right)^{(1-\mu)}$$  \[5\]

From [5], these conclusions follow: The likelihood that a greenfield investment occurs in country j as opposed to home country i is governed by the relative magnitude of the wages ($w_j / w_i$), prices ($p_j / p_i$), the financial quality at country i and the immigrant network $\lambda_{ij}$. It is increasing in the financial stability at home ($\gamma_i$), the relative prices and in the and the immigrant flows.

4. Empirical methodology and data.

We estimate an extended gravity equation which includes the number of migrants to explain bilateral FDI from the host country of immigrants to their country of origin. Thus, this is our basic specification:

As it is usual in the gravity framework, the extent of FDI flows between country pairs is directly proportional to their economic mass (i.e., gross domestic product, GDP) and decreases with distance, a proxy for freight costs, and other factors that affect cross border investments. All the variables measuring these latter factors are detailed in Table 1.

This basic specification is enlarged to include the number of migrants and the existence of a systemic financial crisis. Our baseline specification is the following augmented gravity equation:

$$\ln FDI_{ij} = \beta_1 \ln \left( Y_i \ast Y_j \right) + \beta_2 \ln (nmigr_{ij}) + \beta_3 border_{ij} + \beta_4 colony_{ij} + \beta_5 lang_{ij} + \beta_6 smctry_{ij} + \beta_7 relij + \beta_8 blocked_{ij} + \beta_9 BIT_{ij} + \beta_10 FTA_{ij} + \beta_{11} \ln (migr_{ij}) + \beta_{12} \ln (migr_{ij}) * GR_{it} + \beta_{13} \ln (migr_{ij}) * CR_{it} + \lambda_i + \varepsilon_{ij}$$  \[6\]
where FDI\textsubscript{ijt} is the aggregate investment between home country i and host j in year t; Y denotes the domestic gross product (GDP), mirg\textsubscript{ijt} is yearly stock of migrants from country j who live in country i; GR is dummy set to one if the country suffers a systemic banking crisis in year t; \lambda_t is a fixed year effect; and lastly \epsilon_{ijt} represent an stochastic error term.

Table 1. Gravity variables

<table>
<thead>
<tr>
<th>Gravity variables without time variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>\text{InD}_{ij}</td>
</tr>
<tr>
<td>border\textsubscript{ij}</td>
</tr>
<tr>
<td>col\textsubscript{ij}</td>
</tr>
<tr>
<td>lang\textsubscript{ij}</td>
</tr>
<tr>
<td>rel\textsubscript{ij}</td>
</tr>
<tr>
<td>smctry\textsubscript{ij}</td>
</tr>
<tr>
<td>locked\textsubscript{j}</td>
</tr>
</tbody>
</table>

Gravity variables with time variation

| BIT\textsubscript{ijt}                  | Is a dummy that takes a value of one if the country pair has a bilateral investment treaty in force |
| FTA\textsubscript{ijt}                 | Is a dummy that indicates whether both countries have a free trade agreement in force |

The plain ordinary least squares (OLS) estimation of the gravity equation [6] suffers from several well-known biases. Firstly, there is a mis-specification due to the omission of multilateral resistance terms (Anderson and Van Wincoop's, 2003). The usual solution implies introduce country fixed effects (CFE) for both host and supply countries. Moreover, CFE does not eliminate completely the unobserved bilateral heterogeneity owning to ignoring other variables at the country pair level that might affect bilateral FDI. However, country-pair fixed effects (CPFE) eliminate all dyadic variables with no time variation plus distance. In particular, the CPFE compromises only GDP, BIT, FTA and migration.
Secondly, the log version of the gravity equation incurs in a self-selection bias which stems from the omission of zeros. This problem has been solved the Pseudo-Poisson Maximum likelihood (PPML) estimator proposed by Silva and Tenreyro (2006), which presents consistent estimates since this estimator does not require a log-linearization of the variables.\(^4\) In particular, we use the following specification:

\[
FDi_{ijt} = e^{(\beta_1 \ln(Y_{it}Y_{jt}) + \beta_2 \ln(D_{ij}) + \beta_3 \text{colony}_{ij} + \beta_4 \text{lang}_{ij} + \beta_5 \text{smctry}_{ij} + \beta_6 \text{rel}_{ij} + \beta_7 \text{locked}_{ij} + \beta_8 \text{BIT}_{ijt} + \beta_9 \text{FTA}_{ijt} + \varepsilon_{ijt})}
\]

Additionally to the total value of FDI, we also introduce as a dependent variable the number of FDI projects. Gil Pareja et al. (2013) focus on FDI decisions and confirm this significant negative impact on the number of projects undertaken investment decision, but not on the amount invested by foreign firms. Since the initial cost of foreign production (e.g., constructing a manufacturing plant) is relatively constant, under credit constraints, firms place less rather than smaller bets.

Besides, the incorporation of trade and FDI margins reduces an over aggregation bias of capital flows in the estimation of the gravity equation (Hillberry & Hummels, 2008; Hillberry, 2002) and therefore, it is an specification more closely grounded in theory. Additionally, it reveals information on existing links on the creation of new partners (Felbermayr & Kohler, 2006).

5. Data

The Financial Times Ltd. cross-border investment monitor (FDIMarkets, 2013) is the source of the FDI dataset. Investment counts are measured in firm level projects counts and capital flows in constant 2005 USD. The dataset covers bilateral firm-level greenfield investments from 2003 to 2012, aggregated between 190 countries. However,

\(^4\) Moreover, it is robust to heteroskedasticity in the error term (Silva and Tenreyro, 2010) and it assures converge of the maximum likelihood estimation by a previous inspection of the data (Silva & Tenreyro, 2011). Additionally, Bergstrand et al. (2013) argue that the PPML estimator is appropriate for short panel gravity data.
this country size is reduced only to those countries from which we can obtain immigration data, which comes from the OECD.

Immigration may also affect other types of FDI. However, greenfield investments incur in higher plant costs and have a are prone to suffer from credit constraints (Gil-Pareja et al., 2013; Nocke & Yeaple, 2007; Qiu & Wang, 2011). Consequently, greenfield investments are optimal to measure the influence to immigrant networks in the ability of MNEs to procure credit. Overall, the database is heavily unbalanced with 70% zero observations, meaning that not all countries received investment in all years.

The World Bank (2013) is the source of GDP, measured in constant 2005 US dollars. Distance, common language, colony and border come from the CEPII (2011) database and control for freight, information, cultural, historic and administrative transaction costs between country pairs. Religious affinities increases the probability of economic transactions between nations with similar values and beliefs (Helble, 2007). The variable religion was introduced in the gravity equation by Helpman, Melitz, and Rubinstein (2008) as a control variable for religious and common law affinities between trade partners. It is calculated with data from CIA World Factbook (2011) according to the following formula for country each country pair: 

\[ \%\text{Christian}_i \times \%\text{Christian}_j + \%\text{Muslim}_i \times \%\text{Muslim}_j + \%\text{Buddhist}_i \times \%\text{Buddhist}_j + \%\text{Hindu}_i \times \%\text{Hindu}_j + \%\text{Jewish}_i \times \%\text{Jewish}_j \]

Institutional agreements such as Free Trade Agreements and Bilateral Investments Treaties reduce the uncertainty in foreign investments (Bergstrand & Egger, 2013). BIT is manually constructed with data from UNCTAD (2013). The source of FTA is Head, Mayer, and Ries (2010) complimented UNCTAD (2013) data.

The source of systemic banking crises is Laeven and Valencia (2013). These authors build up a database encompassing the period 1970-2011. They identify banking crises as those events which simultaneously verify the following two conditions:

1. Significant signs of financial distress in the banking system (significant bank runs, losses in the banking system, and/or bank liquidations)
2. Significant banking policy intervention measures in response to significant losses in the banking system. \(^5\)

\(^5\) These measures should include at least three out of the following six: (1) Deposit freezes and/or bank holidays; (2) significant bank nationalizations; (3) banks restructuring gross costs; (4) extensive liquidity support; (5) significant guarantees put in place and (6) significant asset purchases.
6. Results and discussion

First, we present in Table 2 our results for all the econometrical models enumerated above using as dependent variable total FDI. Columns (1) and (2) display, respectively, the estimates for the OLSQ and PPML models with country fixed effects. GDP is not significant in either model. Distance, common language and a former colony relationship are significant and show the expected sign (also landlocked, although only in the PPML model). However, sharing a border or religion or a common past as the same country do not have any effect on the volume of investment. Bilateral treaties display an unexpected negative effect on FDI, although free trade treaties are significant only in the OLS estimation.

Table 2. Dependent Variable: Total FDI

<table>
<thead>
<tr>
<th></th>
<th>OLS- CFE</th>
<th>PPML- CFE</th>
<th>OLS- CPFE</th>
<th>PPML- CPFE</th>
<th>OLS- CFE</th>
<th>PPML- CFE</th>
<th>OLS- CPFE</th>
<th>PPML- CPFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(Y_{it} * Y_{jt})</td>
<td>0.011 (0.446)</td>
<td>-0.116 (0.379)</td>
<td>0.089 (0.380)</td>
<td>-0.075 (0.394)</td>
<td>0.041 (0.447)</td>
<td>-0.069 (0.376)</td>
<td>0.136 (0.382)</td>
<td>0.344* (0.178)</td>
</tr>
<tr>
<td>ln(D_{ij})</td>
<td>-0.596*** (0.092)</td>
<td>-0.448*** (0.106)</td>
<td>-0.551*** (0.092)</td>
<td>-0.437*** (0.106)</td>
<td>-0.530*** (0.092)</td>
<td>-0.448*** (0.106)</td>
<td>-0.551*** (0.092)</td>
<td>-0.437*** (0.106)</td>
</tr>
<tr>
<td>FTA_{ij}</td>
<td>-0.380** (0.174)</td>
<td>-0.104 (0.156)</td>
<td>-0.340 (0.289)</td>
<td>-0.044 (0.123)</td>
<td>-0.414** (0.176)</td>
<td>-0.120 (0.159)</td>
<td>-0.333 (0.209)</td>
<td>0.091 (0.087)</td>
</tr>
<tr>
<td>BIT_{ij}</td>
<td>-0.457*** (0.126)</td>
<td>-0.531*** (0.158)</td>
<td>-0.801** (0.332)</td>
<td>-1.107** (0.494)</td>
<td>-0.429*** (0.126)</td>
<td>-0.507*** (0.154)</td>
<td>-0.822** (0.332)</td>
<td>-0.099 (0.141)</td>
</tr>
<tr>
<td>border_{ij}</td>
<td>0.057 (0.219)</td>
<td>-0.126 (0.347)</td>
<td>0.025 (0.216)</td>
<td>-0.192 (0.340)</td>
<td>0.025 (0.216)</td>
<td>-0.192 (0.340)</td>
<td>0.025 (0.216)</td>
<td>-0.192 (0.340)</td>
</tr>
<tr>
<td>lang_{ij}</td>
<td>0.456** (0.177)</td>
<td>0.478*** (0.160)</td>
<td>0.442* (0.179)</td>
<td>0.446*** (0.155)</td>
<td>0.442* (0.179)</td>
<td>0.446*** (0.155)</td>
<td>0.442* (0.179)</td>
<td>0.446*** (0.155)</td>
</tr>
<tr>
<td>colony_{ij}</td>
<td>0.733*** (0.194)</td>
<td>0.966*** (0.188)</td>
<td>0.795*** (0.194)</td>
<td>0.999*** (0.183)</td>
<td>0.795*** (0.194)</td>
<td>0.999*** (0.183)</td>
<td>0.795*** (0.194)</td>
<td>0.999*** (0.183)</td>
</tr>
<tr>
<td>smctry_{ij}</td>
<td>-0.349 (0.336)</td>
<td>-0.139 (0.445)</td>
<td>-0.340 (0.350)</td>
<td>-0.109 (0.463)</td>
<td>-0.340 (0.350)</td>
<td>-0.109 (0.463)</td>
<td>-0.340 (0.350)</td>
<td>-0.109 (0.463)</td>
</tr>
<tr>
<td>relig_{ij}</td>
<td>0.071 (0.465)</td>
<td>0.133 (0.451)</td>
<td>0.064 (0.404)</td>
<td>0.127 (0.447)</td>
<td>0.064 (0.404)</td>
<td>0.127 (0.447)</td>
<td>0.064 (0.404)</td>
<td>0.127 (0.447)</td>
</tr>
<tr>
<td>locked_{ij}</td>
<td>-0.047 (0.116)</td>
<td>-0.306* (0.160)</td>
<td>-0.051 (0.117)</td>
<td>-0.313* (0.162)</td>
<td>-0.051 (0.117)</td>
<td>-0.313* (0.162)</td>
<td>-0.051 (0.117)</td>
<td>-0.313* (0.162)</td>
</tr>
<tr>
<td>ln(migr_{it})</td>
<td>0.119*** (0.039)</td>
<td>0.202*** (0.039)</td>
<td>0.168 (0.192)</td>
<td>0.172 (0.266)</td>
<td>0.118*** (0.039)</td>
<td>0.210*** (0.039)</td>
<td>0.157 (0.192)</td>
<td>0.095 (0.084)</td>
</tr>
<tr>
<td>GR_{it}</td>
<td>- - - -</td>
<td>0.036 (0.094)</td>
<td>0.126 (0.088)</td>
<td>0.119 (0.092)</td>
<td>0.024 (0.033)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>3148</td>
<td>6557</td>
<td>3148</td>
<td>6370</td>
<td>3148</td>
<td>6557</td>
<td>3148</td>
<td>6370</td>
</tr>
<tr>
<td>R²</td>
<td>0.410</td>
<td>0.679</td>
<td>0.024</td>
<td>0.409</td>
<td>0.683</td>
<td>0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country FE</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Country pair FE</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
With regard to our variable of interest, we observe that the presence of immigrants has a positive impact on the volume of investment from the receiving country of migrants to the source country. The impact is higher in the PPML estimation, as expected [quote]. On the other hand, the inclusion of the variable GR has no consequences. More relevant is the substitution of country-fixed effects by country pair fixed effects; first, the dyadic variables are dropped. Second, bilateral investment treaties show a significant effect only in the OLS estimation, whereas in the PPML estimation depends on the GR variable not being included. Third, GDP’s product is significant in the PPML estimation if the GR variable is included. However, the more important variation is that the number of migrants becomes not significant in all cases.

Table 3. Dependent Variable: Number of FDI projects

<table>
<thead>
<tr>
<th></th>
<th>OLS-CFE</th>
<th>PPML-CFE</th>
<th>OLS-CFPE</th>
<th>PML-CFPE</th>
<th>OLS-CFE</th>
<th>PPML-CFE</th>
<th>OLS-CFPE</th>
<th>PML-CFPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(Y_{it} * Y_{jt})</td>
<td>0.095</td>
<td>-0.452</td>
<td>0.101</td>
<td>-0.468</td>
<td>0.122</td>
<td>-0.443</td>
<td>0.134</td>
<td>-0.474</td>
</tr>
<tr>
<td>ln(D_{it})</td>
<td>-0.294*** (0.051)</td>
<td>-0.445*** (0.069)</td>
<td>-0.281*** (0.052)</td>
<td>-0.428*** (0.069)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTA_{ij}</td>
<td>-0.201** (0.105)</td>
<td>-0.091 (0.092)</td>
<td>0.096 (0.106)</td>
<td>0.211* (0.119)</td>
<td>-0.221** (0.107)</td>
<td>-0.114 (0.097)</td>
<td>0.101 (0.106)</td>
<td>0.209* (0.119)</td>
</tr>
<tr>
<td>BIT_{ij}</td>
<td>-0.190*** (0.072)</td>
<td>0.015 (0.076)</td>
<td>0.236* (0.121)</td>
<td>0.306 (0.192)</td>
<td>-0.170** (0.072)</td>
<td>0.066 (0.076)</td>
<td>0.222* (0.121)</td>
<td>0.316 (0.197)</td>
</tr>
<tr>
<td>border_{ij}</td>
<td>0.036 (0.136)</td>
<td>-0.416* (0.224)</td>
<td>0.014 (0.134)</td>
<td>-0.470** (0.227)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lang_{ij}</td>
<td>0.885*** (0.119)</td>
<td>0.683*** (0.094)</td>
<td>0.375*** (0.119)</td>
<td>0.649*** (0.094)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>colony_{ij}</td>
<td>0.420*** (0.130)</td>
<td>0.604*** (0.125)</td>
<td>0.464*** (0.131)</td>
<td>0.650*** (0.123)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>smctry_{ij}</td>
<td>0.130 (0.223)</td>
<td>0.340 (0.363)</td>
<td>0.137 (0.237)</td>
<td>0.364 (0.393)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relig_{ij}</td>
<td>-0.164 (0.201)</td>
<td>-0.183 (0.279)</td>
<td>-0.170 (0.203)</td>
<td>-0.175 (0.278)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>locked_{ij}</td>
<td>-0.011 (0.061)</td>
<td>-0.107 (0.115)</td>
<td>-0.014 (0.061)</td>
<td>-0.127 (0.117)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(migr_{ij})</td>
<td>0.081*** (0.025)</td>
<td>0.182*** (0.022)</td>
<td>-0.024 (0.070)</td>
<td>0.243** (0.123)</td>
<td>0.080*** (0.024)</td>
<td>0.189*** (0.023)</td>
<td>-0.032 (0.070)</td>
<td>0.238* (0.123)</td>
</tr>
<tr>
<td>GR_{it}</td>
<td>0.046 (0.038)</td>
<td>-0.017 (0.041)</td>
<td>0.084** (0.033)</td>
<td>-0.021 (0.041)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>3148</td>
<td>6557</td>
<td>3148</td>
<td>6570</td>
<td>3148</td>
<td>6557</td>
<td>3148</td>
<td>6570</td>
</tr>
<tr>
<td>R²</td>
<td>0.663</td>
<td>0.937</td>
<td>0.084</td>
<td>0.661</td>
<td>0.937</td>
<td>0.085</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country FE</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country pair FE</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

In Table 3, we have used as a dependent variable the number of investment projects between home country i and host j in year t. In this case, the gravity variables more or
less display the same results as in the estimations using total FDI (border is significant now), and the treaties variables have a positive effect on the number of projects once country pair effects are included. Plus, the number of immigrants is significant in all cases but the OLS estimation with country pair fixed effects. However, the dummy GR still remains not significant in most equations (it only displays an unexpected positive effect in the OLS estimation including country pair fixed effects).

The key point in our approach is to identify whether the existence of systemic financial crises affect the ability of migrants to help FDI from their countries of residence to their countries of origin. Thus, what we are going to do next is to introduce an interaction between the number of immigrants and the GR variable. The outcome is presented in Table 4, where we show just the results for our variables of interests (the remaining estimations are available upon request).

### Table 4. Dependent variable: Total FDI and number of FDI projects

<table>
<thead>
<tr>
<th></th>
<th>Total FDI</th>
<th>Number of projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS-CFE</td>
<td>PPML-CFE</td>
</tr>
<tr>
<td>ln(migr$_{jt}$)</td>
<td>0.099*** (0.041)</td>
<td>0.221*** (0.043)</td>
</tr>
<tr>
<td>GR$_{jt}$</td>
<td>-0.657 (0.413)</td>
<td>0.491 (0.507)</td>
</tr>
<tr>
<td>ln(migr$<em>{jt}$) * GR$</em>{jt}$</td>
<td>0.389* (0.038)</td>
<td>-0.028 (0.025)</td>
</tr>
<tr>
<td>ln(migr$<em>{jt}$) * GR$</em>{jt}$</td>
<td>0.046 (0.042)</td>
<td>-0.045 (0.034)</td>
</tr>
</tbody>
</table>

Observations 3148 6557 3148 6370 3148 6557 3148 6370
R$^2$ 0.410 0.687 0.027 0.662 0.938 0.087
Country FE Yes Yes No No Yes Yes No
Country pair FE No No Yes Yes No No Yes

Robust standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

In this case, we observe in the OLS estimations that the existence of systemic financial crisis in the host country makes more useful the information provided by immigrants, both for total FDI and the number of projects which are approved by the investing firms. Besides, the PPML estimations show that the knowledge of immigrants have minor impact if the systemic crisis happens in the origin country.
For the sake of robustness, we replicate the previous estimations using as a dependent variable the number of jobs that MNE create on the host country\(^6\) (Paniagua and Sapena, 2014). MNE transfer human capital and knowledge from the home to the host country and they play an important role in the host’s countries economy (Paniagua & Sapena, 2013). Although several empirical studies have plugged employment data into the gravity equation (Griffith, 2007), Paniagua and Sapena (2014) develop a model which explains the effect of credit constraints on foreign direct employment using the gravity model. In so forth, the estimation of the effect of immigration and credit constraints on foreign jobs using the gravity equation is grounded in theory. They conclude that the Foreign Direct Employment (FDE) created by multinationals is constrained by financial frictions at the home country.

**Table 5. Dependent variable: Number of Jobs**

<table>
<thead>
<tr>
<th></th>
<th>OLS-CFE</th>
<th>PPML-CFE</th>
<th>OLS-CPFE</th>
<th>PML-CPFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\ln(migr_{jt}))</td>
<td>0.128*** (0.037)</td>
<td>0.299*** (0.036)</td>
<td>0.062 (0.162)</td>
<td>0.204 (0.202)</td>
</tr>
<tr>
<td>(GR_{jt})</td>
<td>-0.603 (0.413)</td>
<td>0.445 (0.372)</td>
<td>0.082 (0.029)</td>
<td>0.364 (0.798)</td>
</tr>
<tr>
<td>(\ln(migr_{jt}) \times GR_{jt})</td>
<td>0.065* (0.034)</td>
<td>-0.044 (0.030)</td>
<td>0.001 (0.029)</td>
<td>-0.051 (0.030)</td>
</tr>
<tr>
<td>(\ln(migr_{jt}) \times GR_{jt})</td>
<td>0.041 (0.039)</td>
<td>-0.057 (0.042)</td>
<td>-0.025 (0.035)</td>
<td>-0.066 (0.042)</td>
</tr>
<tr>
<td>Observations</td>
<td>3148</td>
<td>6557</td>
<td>3148</td>
<td>6370</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.508</td>
<td>0.869</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>Country FE</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Country pair FE</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses
* \(p < 0.10\), ** \(p < 0.05\), *** \(p < 0.01\)

In terms of significance, the results are quite similar to those achieved for the total amount of FDI as displayed in Table 4. The existence of systemic crisis in the country of origin of the investment increases the impact of migrants.

One of the main issues concerning the estimation of FDI data is the endogeneity bias (Aisbett, 2009; Bergstrand & Egger, 2013). To combat the endogeneity, we use the Generalized Method of Moments (GMM) estimator. The GMM performs two simultaneous estimations: one in levels with lagged first differences as instruments, and one in first differences with lagged levels as instruments. In particular, we use the system-GMM, which is appropriate for linear dynamic panel-data CPFE models (Arellano and Bond, 1991; Blundell and Bond, 1998). Additionally system-GMM takes

\(^6\) Jobs are the individual employees hired at the host by the MNE (FDIMarkets, 2013).
care of other potentially endogenous variables (Busse, Königer, & Nunnenkamp, 2010), for instance, BIT in our equation.

Table 6. Test of Endogeneity

<table>
<thead>
<tr>
<th></th>
<th>OLS-CFE</th>
<th>PPML-CFE</th>
<th>OLS-CPFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.lfdi1</td>
<td>0.073*** (0.022)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.lp=rojects1</td>
<td>0.064** (0.026)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.ljobs1</td>
<td>0.058** (0.023)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Yit * Yit')</td>
<td>0.961*** (0.253)</td>
<td>0.477*** (0.084)</td>
<td>0.963*** (0.349)</td>
</tr>
<tr>
<td>FTAij</td>
<td>0.390 (0.381)</td>
<td>0.177 (0.133)</td>
<td>0.745 (0.439)</td>
</tr>
<tr>
<td>BITij</td>
<td>-0.612 (0.430)</td>
<td>0.039 (0.099)</td>
<td>-0.465 (0.436)</td>
</tr>
<tr>
<td>ln(migrji)</td>
<td>0.084 (0.225)</td>
<td>-0.005 (0.070)</td>
<td>0.201 (0.256)</td>
</tr>
<tr>
<td>GRit</td>
<td>-0.435 (0.297)</td>
<td>-0.140* (0.072)</td>
<td>-0.529 (0.341)</td>
</tr>
<tr>
<td>ln(migrji) * GRit</td>
<td>0.087*** (0.030)</td>
<td>0.026*** (0.007)</td>
<td>0.096*** (0.034)</td>
</tr>
<tr>
<td>ln(migrji) * GRit</td>
<td>0.061* (0.036)</td>
<td>0.022** (0.010)</td>
<td>0.069* (0.041)</td>
</tr>
</tbody>
</table>

Observations 5862 5862 5862

Robust standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
(dep. Variable log(X+1))

7. Conclusions

The interplay among immigration, capital and trade is essential to understand the way globalization affects economies (Freeman, 2006). The increasing importance of foreign workers into the labor markets either as employees or business people (entrepreneurs) has recently raised the question about their influence on foreign investment. This paper provides new insights into both the migration-FDI link as well as about the impact of financial constraints faced by foreign investors after the 2007 financial crisis.

Migrants normally have knowledge and experience about their home markets that can provide valuable information for foreign investors in their countries. Our results suggest that migration creates a positive externality for both the sending as well as the receiving countries. Benefits for receiving countries originate because immigration creates opportunities for new investment projects. Benefits for sending countries are related to
the new investment projects received by their native countries which may be a source of capital accumulation and technology diffusion.

Apart from their influence on FDI flows, migrant networks are likely to reduce financial constraints faced by foreign firms. This effect manifests itself more pronounced in the existence of new investment projects which likely would not be approved otherwise.

References


