# Migrants' business networks and FDI

[PRELIMINARY]

Marina Murat*, Sara Flisi**

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**Abstract** This paper studies the effects of migration on the bilateral FDI of four European countries, Germany, Italy, France and the U.K. It is based on four distinct datasets that time spans going from 1990 to 2004. It focuses on the impact on FDI of skilled and less-skilled immigrants and on the networks' ties with the less developed countries. Results are that the effects of skilled immigrants are positive and robust for both inward and outward FDI, and that networks linked to the developing countries mostly have stronger effects on the outward FDI than those related to the developed economies.

*Keywords*: migrants' networks, FDI

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**University of Modena and Reggio Emilia, ReCent,*
*** University of Modena and Reggio Emilia, Fondazione "Marco Biagi".*
* corresponding author: e-mail: murat.marina@unimore.it, tel. +390592056884-6033, fax +390592056947, Department of Economics, Viale Berengario, 51. 41100 Modena, Italy

He was born in Thailand, lives in South Africa and carries a UK passport. But Jag Johal, chief executive of investment firm CBA Capital Partners, has undeniable ties to India.
"I speak Hindi and Punjabi. My parents live in Delhi. I visit at least once a year," said Mr Johal. "There are a lot of people like me."
*Financial Times Asia-Pacific, January 9 2007*

[T]he Indian diaspora has created a large, increasingly wealthy and influential ethnic community in the UK, the Middle East and the US. A major source of remittances and investment inflows, these Indians abroad who earn an average of $35,000 annually are responsible for about 20 per cent of foreign direct investment into the country.
*Financial Times Asia-Pacific, May 29 2007*

## I. Introduction

The Indian, Chinese, Italian, Irish, Jewish, Spanish are some of the many diasporas that have spread around the world during the past centuries and decades and recently have fallen under the attention of scholars, journalists and institutions. They are now seen as possible engines of the exchanges of goods, capital and knowledge that normally take place between countries.

The recent economic literature hypothesizes that the international networks of migrants may improve the exchanges between their countries of origin and destination by providing information, matching and referral services that the market and the price system may fail to supply (Rauch and Casella, 2003). The failure is more likely to occur as countries differ more, in their relative endowments of capital and labor (Rauch and Casella, 2003; Rauch and Trindade, 2002) or in their institutions, culture and social norms (Girma and Yu, 2002; Dunlevy, 2006). Differences manifest themselves in informal barriers that obstruct the international economic exchanges and immigrants, by bringing with them customs, attitudes and social rules of their countries of origin and information on business opportunities, lower these barriers.

The empirical research on networks has focused especially on the relations between migration and trade. A partial list of these studies includes Gould (1994), Head and Ries (1998), Rauch (2001), Wagner, Head and Ries (2002), Girma and Yu (2002). A few recent studies have considered the impact of networks on the foreign direct investments of countries (FDI); among them, Gao (2003), Tong (2005), Buch *et al.* (2006), Murat and Pistoresi (2006). Kugler and Rapoport (2005, 2006), Javorcik et al. (2006), and Docquier and Lodigiani (2006) focus especially on the relations between FDI skilled and unskilled migration.

The present paper consider the interactions between migration and the bilateral FDI of four European countries, Germany, Italy, France and the U.K. In the first place, it analyses whether immigrants in these countries, and also emigrants in the case of Italy, have a positive influence on the bilateral FDI between each of the four countries and several partner economies. In the second place, following the evidence found by Kugler and Rapoport (2005, 2006), Javorcik et al. (2006), and Docquier and Lodigiani (2006) we study whether the networks of skilled and unskilled immigrants have different impacts on foreign direct investments. This distinction between higher

and lower skills follows from the observation that investments abroad are more complex, costly and risky operations than trade and, consequently, may require more skills and the availability of more initial resources on the part of immigrants. Individuals with higher education levels are more likely to possess the appropriate knowledge, to form business networks and to possess the required initial capital.

Finally, we investigate whether the networks tied to the developing countries have stronger effects on the bilateral FDI than those liked to the rich economies. It is a well known fact that the biggest share of world's FDI tends to remain within the group of rich economies and that the smallest portion going to the poor economies falls short of what would be predicted by standard theory. Some explanations of these "missing" international investments have focused, respectively, on differences between the developed and developing countries in the relative resources of human capital (Lucas, 1990), on disparities in culture and institutions (Alfaro et al. 2006) or on the high set-up costs of foreign investments (Razin, Rubinstein, Sadka, 2004). These explanations, which are not mutually exclusive, imply that the informal barriers that obstruct the international investments into the developing countries are higher than those separating the developed economies from each other. If this is so, then the impact of transnational networks could also be stronger on the investments going to the poor countries. In other words, a positive effect of the world's migration flows South-North could be that of narrowing the FDI "divide" between the two groups of countries.

The paper main results are that the aggregate migrants' networks positively and significantly influence the bilateral FDI of the four countries examined. More precisely, immigrants affect the outward and inward FDI of Germany and France, the outward FDI of the U.K., and emigrants have a positive and robust impact on the inward and outward bilateral FDI of Italy. The impact of networks on investments abroad, however, depend entirely on the business networks of the skilled, while the impact of the less skilled is negative. Finally, for two of our countries, Germany and Italy, the influence on outward FDI of the networks tied to the developing countries is higher than those linked to the developed economies. The databases of these two countries allow the utilization of a dynamic version of the model that includes the lagged dependent variable. In both cases, the stronger impact of the business links with the less developed countries is confirmed.

The paper is structured as follows. The following Section presents a simple model of migration and international capital mobility that illustrates the different effects of skilled and unskilled migration on developed and developing economies. In Section II the empirical model is developed. The empirical analysis is based on four different databases, one for each country, with time spans that vary from 1990 and 2005. Section IV presents the data and some descriptive

statistics. Section illustrates the main findings. In Section VI some policy implications are discussed and Section VII concludes.

## II. Theoretical framework

*II.1. A small developed economy*

Consider a small open economy where good *Y* is produced according to the technology:

$$Y_t = A(H_t)K_t^{1-\alpha}L_t^{\alpha} \qquad (1)$$

where $A(H_t)$ is the total productivity of factors at time *t* and $H_t$ is the average level of human capital, or average number of efficiency units of labor in the economy.[1] $L_t = N_t H_t$ is the stock of labor designed in efficiency units. $K_t$ is physical capital. Skilled and unskilled workers are perfect substitutes and markets are perfectly competitive. Equalizing to one the efficiency units corresponding to the unskilled workers, denoting with $h>1$ the skill premium and with $P_t$ the proportion of skilled, it follows that $H_t = 1 + P_t(h-1)$. Denoting with *k* the capital to labor ratio, factors' returns of capital, *r*, and labor, *w*, are:

$$r_t = (1-\alpha)A(H_t)\,k_t^{-\alpha} \qquad (2)$$

$$w_t = \alpha A(H_t)\,k_t^{1-\alpha} \qquad (3)$$

Capital is perfectly mobile in the international markets, while labor mobility is restricted by migration costs and countries' immigration policies. The domestic interest rate is given by the international rate of interest augmented by a country "risk factor" which depends on a set of variables, $Z_t$, as corruption, political risk, credibility of institutions, civil and political rights. Hence $r_t = \bar{r} + \pi_t$, where $\bar{r}$ is the international rate of interest and $\pi_t$ is the country premium, with $\pi_t \geq 0$.

The equilibrium capital to labor ratio and the equilibrium wage are

$$k_t = \left[\frac{(1-\alpha)A(H_t)}{\bar{r}+\pi_t}\right]^{\frac{1}{\alpha}} \equiv k(\pi_t, H_t) \qquad (4)$$

[1] The model is based on Kugler and Rapoport (2006), Razin, Rubinstein and Sadka (2004), Docquier and Lodigiani (2006).

$$w_t = \alpha\left[\frac{1-\alpha}{r+\pi_t}\right]^{\frac{1-\alpha}{\alpha}}\left[A(H_t)\right]^{\frac{1}{\alpha}} \equiv w(\pi_t, H_t) \tag{5}$$

with $k_1^{'}<0$, $k_2^{'}>0$ and $w_1^{'}<0$, $w_2^{'}>0$. The economy is developed in that its equilibrium wage is above the wage of the developing countries and consequently has a positive net immigration rate. The sources of the wage gap will be considered below. The economy's equilibrium capital stock is

$$K_t = k_t L_t = \left[\frac{(1-\alpha)A_t L_t^{\alpha}}{r+\pi_t}\right]^{\frac{1}{\alpha}} \tag{6}$$

where $M_t$ is migration. $L_t = (N_t + M_t^U + M_t^S)H_t$ and $H_t = \dfrac{Nt[P_t(h-1)+1] + M_t^U + M_t^S h}{N_t + M_t^U + M_t^S}$. $U$ and $S$ are skilled and unskilled individuals. The derivatives of this expression, $H_U^{'}<0$, $H_S^{'}>0$, $H_P^{'}>0$, show that the average level of human capital in the economy, and hence the overall productivity of factors, is a positive function of the number of skilled immigrants and of the share of skilled workers in the labor force, and a negative function of the number of unskilled immigrants. In turn, the share of skilled workers depends positively on the skill premium and on the skilled immigration, while it decreases with the unskilled immigration, $P_t = \left(h, M_t^U, M_t^S\right)$, $P_h^{'}>0$, $P_U^{'}<0$, $P_S^{'}>0$. In sum, because of its influence on $A(H_t)$ and $L_t$, the immigration of skilled workers has a positive effect on the economy's equilibrium capital stock and on the level of wages. On the other hand, the effects of the unskilled immigration on the equilibrium capital stock are ambiguous. $L_t$ increases, but as a consequence of the larger share of the unskilled labor force, $A(H_t)$ diminishes. From (4) and (5), however, the effects on the wage and the equilibrium capital per worker ratio are unambiguously negative, wages decrease and the economy's production techniques tend to become more labor intensive. The different effects on income and investments of the skilled and unskilled immigration help to explain the selective immigration policies of several developed countries.

*II.2. A small developing economy*

Let's now consider a small, less developed economy having the same technology, labor force $N$, and skill premium $h$, of the developed country, but a lower wage rate. In what follows the

variables of the developing economy will be identified by the sign $^*$. Hence, $N_t^* = N_t$, $h_t^* = h_t$ and equations from (1) to (6) become equations (1*) to (6*).

There may be various reasons for the wage gap between the two economies. In Lucas (1990) it is due to a structural difference in the endowment of human capital between the developed and the developing countries. With $A(H_t) > A^*(H_t^*)$, the return to capital and the capital per worker ratio will be lower in the developing economies. Hence, despite the lower wages, capital, will not flow to the developing countries as predicted by standard theory.

Another possible source of the difference in wages follows from the existence of the informal barriers that impede trade and investments in the international markets. In the model, they are represented by the "risk factor", $\pi$. These barriers may be higher for the developing economies, $\pi_t^* > \pi_t$. With this assumption, even if $A=A^*$, all other things equal, from (4*) and (5*) follows that the developing country's equilibrium wage and capital per worker ratio will be lower than those of the rich economy, $w^* < w$ and $k^* < k$. Hence, the higher informal barriers are sufficient to make the developing country a net emigration economy that receives less FDI from abroad of what would be predicted by standard theory. As in Lucas (1990) the countries' FDI tend to remain within the group of the developed economies, where risks are lower and the returns to capital are higher.

Let's now consider international migration. The effects of the skilled and unskilled immigration in the developed country have been seen in the previous Section. The impact of migration on the developing economy variables can be separated into two components. A direct one, which concerns the modifications of the average level of human capital and of the labor force, $A^*(H_t^*)$ and $L_t^*$, and an indirect one, which is the modification in the informal barriers, or risk factor $\pi_t^*$, induced by the international networks of immigrants. The direct effects are symmetrical to those of the developed economy. They can be deduced from $L_t^* = (N_t^* + M_t^U + M_t^S)H_t^*$ and $H_t^* = \frac{N_t^*[P_t^*(h-1)+1] - M_t^U - M_t^S h}{N_t - M_t^U - M_t^S}$. In this equation the derivatives are $H_U^{*'} > 0$, $H_S^{*'} < 0$, while $H_P^{*'} > 0$. In words, the emigration of skilled individuals decreases the average human capital of the origin country, while the emigration of unskilled individuals improves it. In both cases $L_t^*$ decreases.

The country "risk factor", $\pi_t^*$, depends on $Z_t^*$, a set of variables regarding political stability, corruption, culture, social norms, institutions and, following the literature on networks, the international links built by migrants. The latter lower the uncertainty and distrust of foreign

investors relatively to countries of origin of immigrants, $\pi_t^* = \left(Z_t^*, M_t^{U*}, M_t^{S*}\right)$, hence

$\pi_U^{*'} < 0, \quad \pi_S^{*'} < 0$.

As discussed above, the business networks of skilled migrants are more likely than the low-killed ones to have a significant impact on the bilateral FDI of countries. Investments abroad are complex and risky operations with substantial set up costs, which are more likely to be undertaken by skilled individuals. The relation between the above derivatives can therefore assumed to be $\left|\pi_S^{*'}\right| > \left|\pi_U^{*'}\right|$, skilled networks have a stronger impact on the origin country's risk factor than low skilled migrants.[2]

Together, the direct and indirect effects, will determine the new equilibrium levels of wages of the less developed country, $w^*$, as well as those of $k_t^*$ and of $K_t^*$. As a direct effect, the migration of skilled workers widens the gap between the level of human capital of the developed economy and that of the developing one. It also increases the gap between the equilibrium capital to labor ratio and the one between wages. The long run stock of capital increases in the rich economy ($A$ and $L_t$ increase in (6)) and it decreases in the developing one ($A^*$ and $L_t^*$ decrease in ($6^*$)). Hence, other things equal, the migration of the skilled favours the accumulation of capital in the developed economy and has the opposite effect on the less developed one. This is the "brain drain" effect of migration, which damages poor countries.

The indirect effects are that skilled networks of migrants lower the risk factor related to the country of origin, $\pi_t^*$. When the impact on $\pi_t^*$ is strong enough, it can counterweigh the depressing effects of the brain drain. In this case, the overall effect of the skilled migration on the developing economy, in particular on the inflows of capital from abroad, are positive. In equations (4*) to (6*) $w^*$, $k_t^*$ and $K_t^*$ increase as a consequence of the lower $\pi_t^*$.[3] In the real world the network effect may add up to other possible consequences of the skilled migration that also counteract the brain drain, such as remittances, return migration or improved individual's investments in education in the sending countries.

The emigration of unskilled workers has ambiguous effects on both the developed and developing economies. The direct effects on the developing economy are that the average level of human capital increases $H_U^{*'} > 0$ but $L_t^*$ decreases. From (4*) and (5*) the equilibrium capital per

[2] This assumption is not necessary for the results of the model.

[3] Taking the derivatives in (6*) of $K^*$ with respect to $L^*$, $A^*$ and $\pi^*$, the condition for having an improvement in $K^*$ is that $\pi^*$ decreases sufficiently for the following inequality to hold: $\pi_t^* < \bar{r} + \frac{A^* L^{*\alpha}}{\alpha A^* + L^{*\alpha}}$.

labor ratio and wages increase. This implies that more labor intensive productions will be adopted in the developed economy and, symmetrically, more skilled-labor intensive techniques will implemented in the developing one. From (6*), the stock of capital may either augment or diminish. Hence, the long run effects on the accumulation of capital are ambiguous in both countries.

The indirect effects on the poor country concern the impact of the networks of the less skilled migrants on $\pi_t^*$, and hence on $w^*$, $k_t^*$ and $K_t^*$ and on the inflow of investments from abroad. If these effects are not significant, and if more labor intensive productions in the countries of destination of the unskilled migration substitute for potential investments abroad, then the effect of the unskilled migration on the developing country's investments, both domestic and foreign may be negative. Unskilled emigration and FDI inflows may substitute for each other.[4]

The model predictions are that aggregate migration positively affects FDI, but that this effect is especially due to the presence of skilled immigrants. Besides, as the developing countries' risk factors, or informal barriers, are higher than those of rich economies, we also expect that the immigrants from the less developed countries have a higher impact on bilateral FDI than immigrants from developed economies.

### III. The empirical specification

The empirical specification follows the gravity model tradition. The recent literature on gravity and FDI distinguishes between "vertical" and "horizontal" models of foreign investments. Horizontal FDI take place between similar countries and have the purpose of selling abroad the same goods sold at home. Vertical FDI, on the other hand, either go to less developed countries with relative abundance of labour and natural resources or to other developed countries with relative abundance of specialized resources. Their aim is to save in production costs. Most horizontal investments take place among developed countries while vertical investments tend to follow the North-South direction (Barba Navaretti and Venables, 2004). As discussed above, FDI are expected to be influenced by the economic characteristics of the home and foreign markets, by the cultural and institutional features of countries and also by the international networks of immigrants. Hence, the gravity model we use includes the countries' demand and supply factors, their institutional and cultural characteristics, the stocks of immigrants and, for the case of Italy only, the stocks of emigrants

[4] Assuming an equal negative variation in $L^*$ for the skilled and unskilled migration, it may be objected that, as unskilled migrants rise $A^*$ the reduction in $\pi^*$ required to boost the accumulation of capital (to increase the equilibrium level of $K^*$) is inferior to that required for the skilled migration. However, the unskilled migration may reduce the incentives of firms of the developed countries to invest abroad, because of the reduction of the per capita income ($Ak^a$) at home and because of the narrower wage gap with the poor countries. Besides, the proportion of unskilled migrants in the total migration from a poor country is generally larger than that of the skilled, so the reduction in $L^*$ will in fact be higher, with negative effects on the equilibrium returns to capital, $K^*$.

$$FDI_{it} = \alpha + \beta_1 TGDP_{it} + \beta_2 sq\_GDPDIFF_{it} + \beta_3 PCGDPDIFF_t + \beta_4 DIST_i + \beta_5 OPENNESS_{it} + \beta_6 DUMMYEU15 + \beta_7 DUMMYOECD + \beta_8 CHRISSHARE_i + \beta_9 GOVERNANCE_i + \beta_{10} IMMIGRANTS_{it} + \beta_{11} EMIGRANTS_{it} + \beta_{12} D_t + u_t$$

All variables are at time *t* and, except dummies and indexes, in logarithms.[5] $FDI_{it}$ is the stock of foreign direct investments from the country of origin to the country of destination, *i* is the foreign country, $u_t$ is the error term. We use the pooled OLS method of estimation.

Following Markusen and Maskus (2002), we use the sum of the two countries' GDP (*TGDP*) as a measure of the aggregate volume of demand, and the squared difference between the countries' GDPs (*sq_GDPDIFF*) as an indicator of similarity between them. The horizontal model is consistent with a positive coefficient of *TGDP* and a negative coefficient of *sq_GDPDIFF*. We add the difference in countries' per-capita GDPs (*PCGDPDIFF)* proposed by Gao (2003), as a proxy for relative factor endowments differences. The vertical model of FDI predicts a positive coefficient of the difference in the per-capita GDP of countries, while the horizontal model predicts a negative coefficient. Given that we consider four developed economies, most of their FDI are likely to take place with other rich economies. Hence we expect the horizontal model to prevail.

The great circle distance (*DIST*) between capital cities of the countries of origin and destination of the FDI is meant to capture all the measurable and invisible transaction costs related to travel and communication and has a negative expected sign. The base model is completed with a measure of the commercial openness of countries (*OPENNESS*), which is the share of exports plus imports in each country's GDP. In principle, bilateral FDI and trade can be complements or substitutes, hence no assumptions are made on the sign of this variable.

To control for cultural and institutional similarities between partner countries we augment the base model with a set of indicators. We use a composite index(*GOVERNANCE*), to represent the quality of countries' institutions, we include the share of Christian religion in each country (*CHRISSHARE*) as a proxy for religion and culture and, in the France and U.K. regressions, we add two dummies, indicating the presence of past colonial ties (*DUMMYCOLOTIE*) and of a common language (*DUMMYLANG*) with the foreign economies. Two other dummies indicate countries' membership to economic and political blocks. The first refers to the European Union of 15 members (*DUMMYEU15)* and the second to the OECD (*DUMMYOECD*). They denote trade and political agreements, but may also capture similarities among member countries that escape from

[5] Since taking the logarithm would lead to having negative values for observations for which the total stock of FDI take a value lower than unity, we add one before taking the log.

the above institutional and cultural variables. On the assumption that similarity boosts investments abroad, the expected signs of the cultural, institutional an dummy variables are positive. The time dummies $D_t$ are meant to capture a variety of macroeconomic and FDI policy factors that affect aggregate investments abroad of each of the four countries and the foreign investments in each partner country. Possible omitted variables that vary through time but affect our four European countries and their foreign partners are subsumed in these dummies.

Like Girma and Yu (2002), we choose not to use country-specific fixed effects in the empirical model because this would make impossible to identify the impact of time-invariant variables as distance, religion and governance, which are essential for this study. These same variables, on the other hand, are specific fixed-effect dummies that capture potentially distinct effects on the level of FDI.

The gravity model is then further augmented to include our variables of interest, the immigrant stock from each country of origin (*IMMIGRANTS*) and, in the case of Italy, the stock of emigrants living in each foreign country (*EMIGRANTS)*. Following the theory of networks, these variables are expected to have positive effects on the four economies' bilateral *FDI*.

Because of the complexity of investment operations abroad, the networks of skilled immigrants are expected to have a higher impact than that of the low-skilled immigrants, both for the outward and the inward FDI. In the notation of the previous Section, this is consistent with the assumption that the impact of skilled networks on international informal barriers is higher than that of the networks of less skilled migrants, $\pi_S^{*'} < \pi_U^{*'} < 0$. Hence, in a subsequent specification of the model, the stocks of immigrants are split into the *SKILLED_IMMI* and *LOWSKILLED_IMMI* subsets.

As recalled previously, the biggest share of world FDI remains within the group of developed countries. A closely related question is whether the networks' ties can have an extra value in influencing the international investments going to the developing countries. A way of measuring this effect is by interacting the immigration and emigration variables with the OECD and non-OECD dummies, where the latter represent the group of less developed economies. Given the presumption that the information, matching and referral services that migrants provide may be more valuable when referred to the less developed economies, we expect the sign of the coefficients of the non-OECD subset to be higher. In particular, we expect this stronger effect to hold for the *outward* FDI equations of our four countries. Prices in the developed economies generally convey more information than in the poor economies. In the notation of the theoretical model, $\pi_t < \pi_t^*$. Hence, the transnational ties of networks are more important for firms doing foreign investments into the developing economies.

Our data concern stocks of FDI and stocks of immigrants and emigrants. A relevant specification problem in our empirical analysis is endogeneity, which may arise from two main different sources. The first is the possible presence of omitted variables. Regarding the outward FDI, it may happen that a third variable, for example the liberalization of restrictions with a partner country, simultaneously drives investments towards that economy and emigrants inflows from the country. Regarding the inward FDI, an unobserved positive productivity shock in one of our countries may simultaneously attract capital and immigrants, which induces a correlation between the error term and the network variables. The inclusion of the dummies and of the time fixed effects should, however, obviate for this type of endogeneity.

The second source is reverse causality, which can arise since migration and FDI may influence each other. The employees of multinationals can be transferred to the foreign firm's subsidiaries, or, from the latter to the firm's headquarters. In this case, causality would run from FDI to migration, therefore biasing OLS estimates. This reverse causality problem, however, is more likely to arise in specific cases. Given the bilateral nature of the data considered, it is more likely to concern the interactions between outward FDI and emigration and between inward FDI and immigration. Furthermore, it is more likely to involve the migration of skilled individuals, especially the OECD residents. The latter face low immigration restrictions from foreign countries and are more likely to be sent abroad by the multinationals of the home country. Hence, we expect that the reverse causality problem, if present, may introduce an upward bias especially in the coefficients of the OECD-immigrants in the regressions of the inward equations and of the emigrants in the outward FDI regressions (regarding Italy).[6]

Following previous studies using gravity models (Gould, 1994; Girma and Yu, 2002), we estimate a dynamic version of the above equation using a lagged dependent variable in addition to the other regressors; this allows to account for the autoregressive component of the FDI stocks, and to check for the robustness of the results, too.

## IV. The Data

Four different databases have been utilized, each corresponding to one of the four countries considered, France, Germany, Italy and the United Kingdom. The countries of origin included and the time periods considered vary according to data availability. The partner economies of each of our four countries are listed in the Appendix.

[6] Some recent studies point out that, instead, endogeneity appears to introduce a downward bias, thereby producing an underestimation of the impact of migration on FDI and bilateral trade (Combes and Lafourcade, 2005; Javorcik et al., 2006).

The main sources of migration figures are national censuses and the OECD Database on immigrants and expatriates, *Total population by nationality and country of birth (detailed countries* and *Population 15+ by nationality, country of birth (detailed countries) and educational attainment*. These data are available for a single year, corresponding to the last census, 1999 for France, 2001 for Italy and the UK. For Germany, figures are from the *Microcensus*, and cover the years 1999-2002. The data on Italian emigrants are from AIRE (*Registry Office of Italians Residing Abroad*). The data on bilateral FDI are taken from *Source OECD International Direct Investment Statistics - International direct investment by country Vol. 2005 release 01* for France, and from *UNCTAD WID Country Profiles and National Statistics* for the other countries (for Germany, "International Capital Links", Special Statistical Publication 10, *Deutsche Bundesbank*, April 2005; for the UK, *Foreign Direct Investment - Business Monitor MA4, Office for National Statistics*). Data on GDP, on current prices, and per capita GDP are taken from the *IMF – World Economic Outlook Database, September 2006 Edition*. Distance measures are the great circle distance in km between capital cities, taken from the *USDA-ARS United States Department of Agriculture* – Agricultural Research Service website (*http://www.wcrl.ars.usda.gov/cec/java/capitals.htm*).

Data on the share of Christian religion in each country and the governance indicators are taken from the *CIA World Factbook* and from *World Bank Institute, Governance & Anti-Corruption - Aggregate Governance Indicators 1996-2005*, respectively. Data on openness are from the A. Heston, R. Summers and B. Aten, *Penn World Table Version 6.2*, *Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania*, September 2006.

Table 1 depicts some descriptive statistics. As expected, most of bilateral FDI tend to remain within the group of developed economies. Figures are very similar for the four countries, about 98-99% of inward stocks of FDI and 91-93% of outward FDI involve other OECD countries. On the other hand, the composition of the stock of immigrants by groups of countries, OECD and non OECD, varies substantially, 77% of total immigrants in Italy, 51% in France, 44% in the UK and 30% in Germany originate from non OECD countries.[7] On the other hand, Italian emigrants live prevalently in other developed economies (about 80% in the OECD) although their presence in some developing countries, especially of Latin America, is also quite relevant.

The skills' composition of the immigrant populations also shows a great disparity between countries. Skilled immigrants are 33% of the immigrant population with 15 years or more in the U.K., 17% in France and about 14% in Italy and Germany. The shares of skilled individuals in the non-OECD populations of immigrants with 15 years or more go from the 34% of the U.K. to the

[7] Most non-OECD immigration in Italy originates from African and East European countries, in France from African and north-African countries (some are former colonies); in the U.K. from former British colonies and members of the Commonwealth, in Germany from Eastern European countries.

10% of Italy. Hence, in Table 1, the U.K. is the country with the highest share of skilled immigrants, both considering the OECD and non-OECD immigrants' populations, Italy is the country with the lowest share of skilled among the non-OECD immigrants and Germany is the country with the lowest share of skilled among the OECD immigrants.

**V. Key findings**

The results of the estimations on the four databases share several regularities. The static Models (Models 1 to 4 and 6 to 9 in Tables 2, 4 and 5, and 1 to 5 and 7 to 11 in Table 3) will be considered first. Most coefficients of the base gravity equations are as expected. They are positive and significant for the total GDP variables (*TGDP*) and negative for the difference in countries GDP (*sq_GDPDiff*), both in the inward and outward FDI equations of the four countries (Tables 2 to 4). This confirms the expectation on the prevalence of the horizontal model of FDI. The coefficients of the differences in the per-capita GDP, *PCGDPDiff*, are less homogeneous. For three countries, Germany, Italy and France, results are not robust to the different specifications, while they are positive and significant in the U.K. outward equations (Table 5, Models 1 to 4). This seems to indicate that the U.K. multinationals follow both models of international expansion, horizontal and vertical. The coefficient of the *PCGDPDiff* variable is positive and significant in the inward equations of France, Germany and Italy, suggesting the existence of some vertical forms of *offshoring* among developed countries.

Differently from expected, distance *(DIST)* is not an impediment to the outward FDI of three of our four countries, U.K., Germany and France. This especially holds for the U.K., where the coefficient of the distance variable is positive in Models 1 to 4 of Table 5. At the opposite, it is negative and significant for the Italian outward FDI, in Models 1 to 5 of Table 3. In the regressions corresponding to Germany and France, the signs of the coefficients turn from negative in Model 1 to positive in Model 2 (Tables 2 and 4), suggesting that, as expected, the presence of immigrants lowers the distance costs of investing abroad. The sign of the distance variable is instead negative in the inward regressions of the four countries, in all specifications. This lack of symmetry between the inward and outward FDI seems to indicate a wider geographic expansion of the investments of our four countries into the world markets relatively to those received from abroad. An exception is Italy, where the sign of the coefficient is negative in both the inward and the outward equations.

The differing sign and significance of the coefficient of the *OPENNESS* variable between the regressions and specifications shows an heterogeneity of relations between our four countries' FDI and the partner economies' openness to the international trade. The sign is positive, significant and robust to all the specifications only in the Germany' outward FDI equations (Table 2, Models 1

to 4). Similarly, also the coefficients of the EU and OECD dummies vary between countries and specifications, supporting the impression that the world geographic range of our four countries' FDI is not homogeneous, with those of the U.K. reaching the farthest countries, including the less developed (the two dummies are scarcely significant in both the U.K. inward and outward equations and, as seen, the difference in per-capita incomes is positive in the U.K.'s outward equations), and those of Italy remaining more tied to the nearest and the more developed economies (the EU dummy is positive and significant in all specifications and the OECD dummy is mostly positive in the outward equations of Italy).

The coefficients of the cultural and institutional variables of the augmented base model, concerning religion and governance for the four countries, and colonial ties and language for France and the U.K., show that, especially for the outward FDI, governance matters more than culture, i.e. more than religion, language and colonial ties, and that the similarities with the partner countries are significant for France and Germany, but less for the U.K.

The coefficients of the variables that interest us more, immigration (*IMMIGRANTS*) and, in the case of Italy, also emigration (*EMIGRANTS*), reveal the more remarkable regularities. Considering first the outward equations, Tables 2 to 5 show that the coefficients of immigration are positive and significant in the outward equations of all countries except Italy, where, instead, is positive and robust the coefficient of the emigration variable. This confirms our prior expectations on the positive effects of the transnational networks on the bilateral FDI of our four countries. More precisely, a variation of 10% of the immigrant stock leads to an increase of the outward FDI of above 5% in the U.K., of 4,6% in France and of about 3% in Germany. A parallel increase of 10% in the stock of emigrants corresponds to a rise of about 6,5% of the outward FDI in Italy.[8]

In the inward equations, a 10% increase in the stock of immigrants corresponds to a 3,7% increase in the France and to a 1,2% increase in Germany, while the coefficient is non significant in the U.K. In the case of Italy, an increase of 10% of the stock of *emigrants* corresponds to an increase of 4,7% of the inward FDI. In both cases, of inward and outward FDI, the emigrants' coefficients are higher than those corresponding to immigration.

The splitting of the immigrants' populations into skilled and low-skilled leads to results that clearly give support to our prior expectation that the networks of skilled immigrants have the strongest effects on the countries' foreign investments. In the outward FDI regressions, an increase of 10% of the stocks of skilled immigrants rise the countries' investments abroad of 15,5% for the U.K., of 5,6% for France, of 4,5% for Germany (at the 1% confidence level). The coefficient is positive but not significant for the Italian regressions. Hence, in three of our four economies the

[8] The results on Germany are consistent with the findings of Buch *et al.* (2006), based on firm-level data.

business networks of skilled immigrants have very strong and robust effects on the foreign investments going to their countries of origin.

The positive and strong relation between skilled networks and FDI is present also in the inward equations, where an increase of 10% in the stock of skilled immigrants is related to an increase in the inward FDI of 11% in the U.K., of 10% in Germany, of 8% in France and in Italy (in all regressions at the 1% confidence level).

The relation between the unskilled immigration and FDI is negative in almost all regressions of the four databases, both for the outward and the inward equations. The only positive coefficient, regarding the outward FDI of France, is non significant and has a very low value (Model 3, Table 4). These results are consistent with the very high coefficients of the skilled networks variables and reveal that the positive results of the aggregate immigration variable of Models 2 and 7 for Germany, France and the U.K. (and Models 3 and 9 for Italy), depend entirely on the subset of the skilled immigrants, which compensate for the negative effects of the unskilled. In terms of the theoretical model of Section II, the negative impact of the low skilled on the host country outward FDI can be interpreted as due to a weak influence of the less skilled on $\pi_t^*$, the origin country's risk factor, together with an impact on the productive structure of the receiving country, where more low-skilled intensive goods ca be produced at home rather than abroad (Hanson Slaughter, 1999).[9] Regarding the inward FDI, the negative relation could be interpreted as a preference of the firms of the countries of origin of immigrants to invest where the presence of skilled nationals and business networks is stronger. In sum, as expected, the impact of the networks of skilled immigrants on the countries FDI is positive, robust and stronger than that of the unskilled. Besides, the networks effect of the latter on bilateral FDI are not strong enough to compensate for the substitution effects. These findings are consistent with the results of previous studies. In Kugler and Rapoport (2005) unskilled immigrants in the U.S. and the country outward FDI are substitutes contemporaneously but complements in the longer run, in Kugler and Rapoport (2006) unskilled immigration and FDI are negatively related, especially within the group of the European countries, in Aroca and Maloney (2005), the relation between the U.S. FDI in Mexico and the Mexican immigration in the U.S. is negative.

[9] More disaggregated data, on the sectors of employment of immigrants, would be useful to analyse these results. At the present level of aggregation, a strict interpretation of the negative relation is that more unskilled immigrants from a certain country have a negative impact on the FDI of the host economy that go to their country of origin. It may also be the case, however, that the low-skilled immigration from a country has an effect on the FDI going to other sending countries, which are similar in the relative abundance of low skilled labor. More low skilled immigration in Italy from China may curtail the potential Italian investments in Morocco, and more low-skilled immigration from Morocco can slower the Italian foreign investments in China. In this case the regression coefficients of the low-skilled immigration variable would take a negative value, even if the relations of substitution are not strictly bilateral.

The final hypothesis tested in this study concerns the possibility of an extra-value of the networks linked to the developing countries. In particular, we are interested in the coefficients of the outward equations and in the possibility that the business networks of immigrants may boost the investments going from the rich to the poor countries. The results of this partition of the variable immigration may be of interest in the inward equation also, but for the traditional reasons.

Regarding the outward equations, results are that the skilled non-OECD immigrants have the strongest positive effects on the FDI to their countries of origin in the case of Italy (Model 5 of Table 3), while their influence is positive and significant but not statistically different from that of the OECD immigrants in the regressions regarding Germany, France and the UK (Models 4 of Tables 2, 4 and 5). In the inward equations, the effects of the skilled non-OECD immigrants in the U.K. regression are positive and significant (Model 10 of Table 5), while the coefficients of the two subsets do not differ significantly in the regression regarding Italy (they are both positive and significant at the 1% level, in Model 11 of Table 3), and are higher for the skilled- OECD immigrants for Germany and France (Models 10 of Tables 2 and 4).

The dynamic version of the above regressions can now be taken into consideration. The regressions include the lagged dependent variable and are useful to check the robustness of the results of the static models. Due to the limited number of time periods covered by the databases regarding France and the U.K. and the substantial time distance between the observations, the dynamic regressions will be considered only for Germany and Italy. The above partition of variables has been maintained: immigrants are split into skilled and unskilled, and the former are interacted with the OECD and non-OECD dummies.

The results of the dynamic regressions for the outward FDI (Model 5 of Table 2 and 6 of Table 3) confirm our expectations that the migrants' networks tied to the developing countries have a stronger impact on the investments abroad. In particular, a 10% increase in the stock of non-OECD skilled immigrants in Germany has a long run effect of a 11,1% rise in the country's bilateral FDI. A parallel increase of 10% of the Italian emigrants in the non-OECD countries leads to a long run increase of 6,3% of the Italian FDI in their countries of residence, while the values of the coefficients of the migration variables to and from the OECD countries are lower and non significant for both Germany and Italy.

The inward equations depict a different scenario (Models 10 of Table 2 and 12 of Table 3). The coefficients of the immigrants' variables are non significant for Germany. The regression on the Italian data shows that a 10% increase of the emigrants in the OECD countries corresponds to a long run rise of 5,4% in the inward FDI in Italy, from the emigrants' countries of residence. Hence, while the Italian emigrants living in the developing countries attract the Italian investments to their

countries of residence, those living in the rich economies invest and promote the foreign investments in Italy. The weakest influence of the immigrants' networks may depend on the country's strongest ties with the Italian emigrants, which emerge from all specifications of Table 3, but also on the more limited presence of skilled immigrants, especially from the non-OECD countries, relatively to their presence in the other three European countries examined (Table 1).

These results confirm our expectation that the information and enforcement mechanisms of business networks are stronger when they help to overcome the highest barriers, presumably those that separate developed and the developing countries. Note that the influence of these networks persist in equations that already include among the regressors various institutional and cultural proxies of the dissimilarities between countries. This seems to suggest that the mere fact of being outside the "club" of the developed economies diminishes a country's possibility of receiving investments from abroad and, at the same time, rises the importance of the international ties.

A last issue concerns potential problems of endogeneity and reverse causation between the FDI and migration. As said above, this possibility may be higher for the relations between inward FDI and immigration and between outward FDI and emigration. Also, it can be more pronounced for the skilled migrants of the OECD economies. The results of the dynamic equations show that the two cases of potential reverse causation, of outward FDI and emigration and of inward FDI and immigration are excluded for the German data. In the case of Italy, the long history of the Italian emigration suggests that migration is likely to precede FDI. [10]

## V. Policy implications

The international links of business networks can have a positive impact on the bilateral FDI of both developed and developing countries. Hence, both sides should be interested in supporting the formation of international business networks and in strengthen their transnational ties. The positive effects of networks are likely to be positively related to the immigrants' integration into the host country's economy and society. A deeper and more rapid integration process may weaken the ties of any single individual with his country of origin, but may also strengthen and make more pervasive the performance of the business community. The ties themselves may be reinforced by migrants having the possibility of making frequent trips to their countries of origin. The latter, as other forms of direct interactions, may be facilitated by policies implemented by both the receiving and the origin economies (Rauch, 2003).

## VI. Conclusions

[10] Granger panel tests of causality have been performed for Germany and Italy, which show that FDI depend on immigration and not vice versa. Observations are not enough to perform the same tests on France and the U.K.

This paper shows that the bilateral FDI of Germany, France and the U.K. are positively related to the stocks of immigrants present in these economies, and, in the case of Italy, of the Italian emigrants living abroad. In the three former countries, however, these effects depend crucially on the business networks of the skilled immigrants, without which the relation between investments abroad and immigration is mostly negative.

The business networks of immigrants in Germany and of Italian emigrants abroad have a stronger influence on the FDI going to the developing countries. The positive effects of diasporas on the FDI going to the poor countries may help to alleviate the negative impact of the brain drain caused by the skilled migration.

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## Table 1 - Summary statistics of some variables of interest [1]

| | Inward FDI | | Outward FDI | | Emigrants | |
|---|---|---|---|---|---|---|
| ***France*** | | | | | | |
| Total | 240.519 | 100% | 326.346 | 100% | | |
| OECD | 236.496 | 98,33% | 297.167 | 91,06% | | |
| Non OECD | 4.023 | 1,67% | 29.179 | 8,94% | | |
| ***Germany*** | | | | | | |
| Total | 274.789 | 100% | 619.990 | 100% | | |
| OECD | 270.120 | 98,30% | 575.956 | 92,90% | | |
| Non OECD | 4.669 | 1,70% | 44.034 | 7,10% | | |
| ***Italy*** | | | | | | |
| Total | 108.954 | 100% | 170.113 | 100% | 2.159.959 | 100% |
| OECD | 107.526 | 98,69% | 157.683 | 92,69% | 1.735.636 | 80,36% |
| Non OECD | 1.428 | 1,31% | 12.430 | 7,31% | 424.323 | 19,64% |
| ***United Kingdom*** | | | | | | |
| Total | 483.457 | 100% | 811.599 | 100% | | |
| OECD | 474.259 | 98,10% | 751.032 | 92,54% | | |
| Non OECD | 9.198 | 1,90% | 60.567 | 7,46% | | |

| | Immigrants | | Skilled immigrants | Share of skilled migration [2] |
|---|---|---|---|---|
| ***France*** | | | | |
| Total | 4.174.651 | 100% | 694.372 | 17,39% |
| OECD | 2.044.143 | 48,97% | 275.727 | 14,06% |
| Non OECD | 2.130.508 | 51,03% | 418.645 | 20,61% |
| ***Germany*** | | | | |
| Total | 6.386.690 | 100% | 764.206 | 14,25% |
| OECD | 4.474.056 | 70,05% | 482.174 | 12,91% |
| Non OECD | 1.912.634 | 29,95% | 282.032 | 17,33% |
| ***Italy*** | | | | |
| Total | 955.802 | 100% | 116.012 | 14,88% |
| OECD | 215.520 | 22,55% | 58.029 | 29,09% |
| Non OECD | 740.282 | 77,45% | 57.983 | 10,00% |
| ***United Kingdom*** | | | | |
| Total | 3.260.944 | 100% | 999.224 | 33,02% |
| OECD | 1.841.522 | 56,47% | 547.084 | 32,39% |
| Non OECD | 1.419.422 | 43,53% | 452.140 | 33,82% |

[1] Data are referred to the samples used in the empirical analysis.
The size of each samples varies according to data availability
Data concern the year of the latest census in each country (France: 1999; Italy, Germany and UK: 2001)

[2] The share of skilled migration is calculated on immigrants aged 15 and over
(Skilled immigrants / Immigrants aged 15 and over)

**Table 2 - Migrants networks and FDI - Germany**

| **Dependent variable:** | **Outward FDI** | | | | | **Inward FDI** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Static models* | | | | *Dynamic model* | *Static models* | | | | *Dynamic model* |
| *Explanatory variables* | *Model 1* | *Model 2* | *Model 3* | *Model 4* | *Model 5* | *Model 6* | *Model 7* | *Model 8* | *Model 9* | *Model 10* |
| l_TGDP | 3,914 *** | 3,356 *** | 3,029 *** | 3,104 *** | 0,114 * | 3,813 *** | 3,645 *** | 2,792 *** | 2,321 *** | 0,068 |
| | (0,239) | (0,240) | (0,243) | (0,266) | (0,069) | (0,263) | (0,272) | (0,260) | (0,275) | (0,099) |
| l_sq_GDPDIFF | -0,681 *** | -0,674 *** | -0,607 *** | -0,609 *** | -0,016 | -0,603 *** | -0,611 *** | -0,510 *** | -0,514 *** | -0,016 |
| | (0,091) | (0,088) | (0,087) | (0,087) | (0,022) | (0,099) | (0,099) | (0,091) | (0,090) | (0,031) |
| l_PCGDPDIFF | 0,064 *** | 0,016 | 0,024 | 0,027 | 0,009 * | 0,160 *** | 0,174 *** | 0,177 *** | 0,210 *** | 0,006 |
| | (0,019) | (0,019) | (0,019) | (0,019) | (0,005) | (0,022) | (0,023) | (0,021) | (0,022) | (0,008) |
| l_DIST | -0,128 *** | 0,145 ** | 0,166 *** | 0,158 *** | -0,021 | -0,573 *** | -0,470 *** | -0,353 *** | -0,295 *** | 0,013 |
| | (0,050) | (0,057) | (0,057) | (0,058) | (0,014) | (0,067) | (0,080) | (0,075) | (0,074) | (0,026) |
| l_OPENNESS | 0,150 | 0,405 *** | 0,452 *** | 0,451 *** | 0,030 | -0,318 ** | -0,208 | 0,028 | 0,040 | 0,018 |
| | (0,098) | (0,099) | (0,098) | (0,098) | (0,024) | (0,124) | (0,132) | (0,122) | (0,121) | (0,042) |
| DUMMYEU15 | 0,682 *** | 0,385 ** | 0,495 *** | 0,520 *** | -0,092 ** | 1,225 *** | 1,108 *** | 1,274 *** | 1,161 *** | 0,155 *** |
| | (0,163) | (0,161) | (0,160) | (0,164) | (0,040) | (0,179) | (0,186) | (0,170) | (0,169) | (0,059) |
| DUMMYOECD | 1,495 *** | 1,180 *** | 1,164 *** | 1,570 *** | 0,137 | -0,171 | -0,318 | -0,296 | -3,395 *** | -0,037 |
| | (0,153) | (0,153) | (0,150) | (0,596) | (0,149) | (0,188) | (0,200) | (0,182) | (0,688) | (0,246) |
| CHRISSHARE | -0,229 * | 0,139 | 0,001 | 0,007 | 0,032 | -1,088 *** | -0,986 *** | -1,174 *** | -1,128 *** | -0,072 |
| | (0,122) | (0,125) | (0,127) | (0,127) | (0,031) | (0,177) | (0,183) | (0,169) | (0,167) | (0,059) |
| GOVERNANCE_Std | 2,623 *** | 2,946 *** | 2,745 *** | 2,741 *** | 0,209 *** | 3,572 *** | 3,908 *** | 3,144 *** | 2,851 *** | 0,137 |
| | (0,277) | (0,271) | (0,270) | (0,270) | (0,070) | (0,402) | (0,428) | (0,396) | (0,395) | (0,143) |
| l_IMMIGRANTS | | 0,291 *** | | | | | 0,117 ** | | | |
| | | (0,033) | | | | | (0,048) | | | |
| l_LOWSKILLED_IMMI | | | -0,048 | -0,047 | 0,002 | | | -0,626 *** | -0,637 *** | -0,003 |
| | | | (0,060) | (0,060) | (0,015) | | | (0,072) | (0,071) | (0,026) |
| l_SKILLED_IMMI | | | 0,448 *** | | | | | 1,053 *** | | |
| | | | (0,073) | | | | | (0,091) | | |
| l_SKILLED_IMMI_OECD | | | | 0,406 *** | 0,026 | | | | 1,329 *** | 0,003 |
| | | | | (0,094) | (0,024) | | | | (0,107) | (0,041) |
| l_SKILLED_IMMI_NONOECD | | | | 0,455 *** | 0,039 ** | | | | 0,951 *** | -0,005 |
| | | | | (0,074) | (0,018) | | | | (0,092) | (0,034) |
| Time dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| const | -33,025 *** | -30,893 *** | -28,565 *** | -29,670 *** | -1,287 | -29,460 *** | -29,364 *** | -22,677 *** | -15,144 *** | -0,469 |
| | (4,404) | (4,269) | (4,227) | (4,511) | (1,119) | (4,647) | (4,643) | (4,288) | (4,520) | (1,535) |
| Adjusted $R^2$ | 0,695 | 0,716 | 0,725 | 0,724 | 0,984 | 0,718 | 0,720 | 0,765 | 0,773 | 0,976 |
| Number of observations | 1112 | 1107 | 1107 | 1107 | 1017 | 687 | 683 | 683 | 683 | 617 |

Notes: *** 1%, ** 5%, * 10% significant level; heteroskedasticity robust standard errors are in the parentheses.
The variable l_PCGDPDIFF is the positive difference (zero otherwise) between the sending and the receiving country.

**Table 3 - Migrants networks and FDI - Italy**

| **Dependent variable:** | **Outward FDI** | | | | | | **Inward FDI** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Static models* | | | | | *Dynamic model* | *Static models* | | | | | *Dynamic model* |
| *Explanatory variables* | *Model 1* | *Model 2* | *Model 3* | *Model 4* | *Model 5* | *Model 6* | *Model 7* | *Model 8* | *Model 9* | *Model 10* | *Model 11* | *Model 12* |
| l_TGDP | 1,944 *** | 1,194 *** | 0,876 *** | 0,590 ** | 1,154 *** | 0,075 | 2,181 *** | 1,550 *** | 1,160 *** | 0,417 | 0,693 * | 0,210 * |
| | (0,271) | (0,207) | (0,249) | (0,275) | (0,306) | (0,086) | (0,263) | (0,237) | (0,298) | (0,319) | (0,362) | (0,118) |
| l_sq_GDPDIFF | -0,299 *** | 0,040 | 0,004 | 0,001 | -0,044 | -0,005 | -0,392 *** | -0,150 *** | -0,112 * | -0,082 | -0,098 | -0,016 |
| | (0,060) | (0,049) | (0,053) | (0,053) | (0,052) | (0,014) | (0,060) | (0,057) | (0,064) | (0,062) | (0,063) | (0,019) |
| l_PCGDPDIFF | -0,028 | 0,032 | 0,023 | 0,011 | 0,003 | -0,005 | 0,266 *** | 0,243 *** | 0,270 *** | 0,262 *** | 0,253 *** | 0,015 |
| | (0,031) | (0,023) | (0,028) | (0,030) | (0,031) | (0,008) | (0,030) | (0,026) | (0,034) | (0,033) | (0,035) | (0,012) |
| l_DIST | -0,290 *** | -0,166 ** | -0,179 * | -0,253 ** | -0,327 *** | -0,058 * | -0,121 | -0,011 | -0,008 | -0,078 | -0,123 | -0,025 |
| | (0,096) | (0,072) | (0,101) | (0,103) | (0,103) | (0,031) | (0,098) | (0,086) | (0,126) | (0,123) | (0,127) | (0,044) |
| l_OPENNESS | -0,532 *** | 0,361 ** | -0,038 | -0,300 | 0,023 | 0,069 | -0,324 * | 0,296 * | 0,130 | 0,049 | 0,139 | 0,019 |
| | (0,186) | (0,148) | (0,193) | (0,206) | (0,221) | (0,061) | (0,188) | (0,174) | (0,233) | (0,237) | (0,266) | (0,086) |
| DUMMYEU15 | 0,808 *** | 1,052 *** | 0,909 *** | 0,763 *** | 0,784 *** | -0,040 | 0,974 *** | 1,173 *** | 1,255 *** | 0,927 *** | 0,969 *** | 0,143 * |
| | (0,243) | (0,182) | (0,212) | (0,223) | (0,218) | (0,059) | (0,238) | (0,209) | (0,252) | (0,255) | (0,257) | (0,082) |
| DUMMYOECD | -0,028 | 0,831 *** | 1,150 *** | 1,304 *** | 5,977 *** | 0,564 | -0,665 ** | 0,067 | 0,317 | 0,281 | 2,793 * | 0,983 * |
| | (0,266) | (0,205) | (0,250) | (0,260) | (1,220) | (0,383) | (0,274) | (0,249) | (0,322) | (0,323) | (1,593) | (0,566) |
| CHRISSHARE | 0,256 | -1,255 *** | -0,823 *** | -0,668 *** | -0,798 *** | 0,020 | 0,211 | -0,964 *** | -1,024 *** | -1,061 *** | -1,163 *** | -0,171 |
| | (0,255) | (0,209) | (0,245) | (0,253) | (0,246) | (0,072) | (0,258) | (0,251) | (0,306) | (0,301) | (0,311) | (0,106) |
| GOVERNANCE | 0,462 ** | -0,387 ** | -0,213 | -0,261 | -0,182 | 0,015 | 1,121 *** | 0,415 ** | 0,238 | 0,182 | 0,231 | 0,077 |
| | (0,210) | (0,164) | (0,201) | (0,207) | (0,207) | (0,059) | (0,201) | (0,187) | (0,246) | (0,246) | (0,248) | (0,084) |
| l_EMIGRANTS | | 0,647 *** | 0,520 *** | 0,510 *** | | | | 0,457 *** | 0,474 *** | 0,533 *** | | |
| | | (0,036) | (0,044) | (0,046) | | | | (0,042) | (0,053) | (0,053) | | |
| l_EMIGRANTS_OECD | | | | | 0,418 *** | -0,007 | | | | | 0,526 *** | 0,048 ** |
| | | | | | (0,057) | (0,017) | | | | | (0,065) | (0,024) |
| l_EMIGRANTS_NONOECD | | | | | 0,682 *** | 0,055 ** | | | | | 0,598 *** | 0,043 |
| | | | | | (0,063) | (0,022) | | | | | (0,081) | (0,030) |
| l_IMMIGRANTS | | | 0,014 | | | | | | 0,074 | | | |
| | | | (0,079) | | | | | | (0,095) | | | |
| l_LOWSKILLED_IMMI | | | | -0,081 | -0,016 | 0,032 | | | | -0,545 *** | -0,556 *** | 0,008 |
| | | | | (0,120) | (0,124) | (0,036) | | | | (0,137) | (0,146) | (0,052) |
| l_SKILLED_IMMI | | | | 0,154 | | | | | | 0,821 *** | | |
| | | | | (0,130) | | | | | | (0,154) | | |
| l_SKILLED_IMMI_OECD | | | | | -0,013 | 0,026 | | | | | 0,711 *** | -0,065 |
| | | | | | (0,144) | (0,041) | | | | | (0,175) | (0,064) |
| l_SKILLED_IMMI_NONOECD | | | | | 0,373 ** | 0,020 | | | | | 0,993 *** | 0,084 |
| | | | | | (0,158) | (0,047) | | | | | (0,195) | (0,072) |
| Time dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| const | -7,657 * | -15,529 *** | -7,430 * | -1,797 | -12,708 *** | -0,801 | -13,022 *** | -16,978 *** | -12,248 *** | -2,416 | -7,613 | -2,712 |
| | (4,263) | (3,218) | (3,856) | (4,267) | (4,894) | (1,350) | (4,124) | (3,623) | (4,511) | (4,802) | (5,808) | (1,843) |
| Adjusted $R^2$ | 0,553 | 0,750 | 0,751 | 0,757 | 0,773 | 0,985 | 0,749 | 0,808 | 0,832 | 0,850 | 0,850 | 0,987 |
| Number of observations | 423 | 423 | 274 | 266 | 266 | 225 | 398 | 398 | 261 | 254 | 254 | 215 |

Notes: *** 1%, ** 5%, * 10% significant level; heteroskedasticity robust standard errors are in the parentheses.
The variable l_PCGDPDIFF is the positive difference (zero otherwise) between the sending and the receiving country.

**Table 4 - Migrants networks and FDI - France**

| **Dependent variable:** | **Outward FDI** | | | | | **Inward FDI** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Static models* | | | | *Dynamic model* | *Static models* | | | | *Dynamic model* |
| *Explanatory variables* | *Model 1* | *Model 2* | *Model 3* | *Model 4* | *Model 5* | *Model 6* | *Model 7* | *Model 8* | *Model 9* | *Model 10* |
| l_TGDP | 4,371 *** | 3,612 *** | 3,344 *** | 2,934 *** | 1,167 | 4,032 *** | 3,461 *** | 2,958 *** | 2,038 *** | 0,236 |
| | (0,711) | (0,721) | (0,731) | (0,906) | (0,811) | (0,582) | (0,599) | (0,593) | (0,730) | (0,622) |
| l_sq_GDPDIFF | -0,306 * | -0,256 * | -0,252 * | -0,231 | -0,032 | -0,273 ** | -0,252 * | -0,244 * | -0,204 | -0,046 |
| | (0,162) | (0,151) | (0,150) | (0,153) | (0,122) | (0,137) | (0,131) | (0,126) | (0,126) | (0,093) |
| l_PCGDPDIFF | 0,127 * | 0,042 | 0,056 | 0,042 | 0,040 | 0,178 *** | 0,245 *** | 0,223 *** | 0,262 *** | 0,046 |
| | (0,067) | (0,069) | (0,069) | (0,071) | (0,069) | (0,059) | (0,060) | (0,058) | (0,061) | (0,058) |
| l_DIST | 0,051 | 0,034 | 0,085 | 0,117 | -0,219 | -0,354 ** | -0,295 | -0,227 | -0,151 | 0,204 |
| | (0,195) | (0,212) | (0,212) | (0,216) | (0,190) | (0,163) | (0,181) | (0,176) | (0,178) | (0,143) |
| l_OPENNESS | 0,294 | 0,587 * | 0,626 ** | 0,598 * | 0,137 | 0,161 | 0,428 | 0,491 * | 0,432 * | 0,396 * |
| | (0,288) | (0,316) | (0,314) | (0,317) | (0,277) | (0,239) | (0,269) | (0,260) | (0,259) | (0,209) |
| DUMMYEU15 | 1,737 *** | 0,493 | 0,576 | 0,424 | -0,925 | 2,097 *** | 1,269 ** | 1,399 *** | 1,074 ** | 0,804 * |
| | (0,632) | (0,618) | (0,616) | (0,648) | (0,655) | (0,520) | (0,517) | (0,499) | (0,517) | (0,482) |
| DUMMYOECD | 0,808 | -0,201 | -0,170 | -1,979 | -0,273 | 0,198 | -0,387 | -0,328 | -4,428 ** | 1,550 |
| | (0,553) | (0,566) | (0,562) | (2,421) | (2,086) | (0,459) | (0,481) | (0,464) | (1,995) | (1,659) |
| DUMMYLANG | 0,948 * | 1,486 *** | 1,499 *** | 1,397 *** | 0,065 | -0,100 | 0,478 | 0,479 | 0,254 | 0,324 |
| | (0,520) | (0,520) | (0,516) | (0,534) | (0,508) | (0,432) | (0,442) | (0,427) | (0,435) | (0,377) |
| DUMMYCOLOTIE | -0,248 | -1,424 *** | -1,520 *** | -1,375 ** | -0,865 | 0,121 | -0,792 * | -0,893 ** | -0,574 | -0,944 ** |
| | (0,477) | (0,537) | (0,538) | (0,571) | (0,531) | (0,398) | (0,457) | (0,445) | (0,466) | (0,400) |
| CHRISSHARE | -0,332 | 0,235 | 0,142 | 0,123 | 0,767 * | -0,749 ** | -0,515 | -0,674 * | -0,724 * | -1,032 *** |
| | (0,442) | (0,461) | (0,461) | (0,462) | (0,405) | (0,368) | (0,392) | (0,380) | (0,377) | (0,306) |
| GOVERNANCE_Std | 2,438 ** | 3,146 *** | 3,081 *** | 3,103 *** | 2,045 ** | 1,563 * | 2,253 ** | 2,071 ** | 2,143 ** | 0,389 |
| | (0,994) | (1,081) | (1,073) | (1,075) | (0,920) | (0,807) | (0,896) | (0,865) | (0,856) | (0,687) |
| l_IMMIGRANTS | | 0,463 *** | | | | | 0,367 *** | | | |
| | | (0,115) | | | | | (0,097) | | | |
| l_LOWSKILLED_IMMI | | | 0,012 | -0,054 | 0,167 | | | -0,277 * | -0,427 ** | -0,146 |
| | | | (0,193) | (0,211) | (0,191) | | | (0,158) | (0,172) | (0,146) |
| l_SKILLED_IMMI | | | 0,564 ** | | | | | 0,827 *** | | |
| | | | (0,237) | | | | | (0,196) | | |
| l_SKILLED_IMMI_OECD | | | | 0,828 ** | 0,209 | | | | 1,426 *** | 0,206 |
| | | | | (0,418) | (0,372) | | | | (0,344) | (0,295) |
| l_SKILLED_IMMI_NONOECD | | | | 0,587 ** | 0,203 | | | | 0,879 *** | 0,296 * |
| | | | | (0,240) | (0,218) | | | | (0,195) | (0,169) |
| Time dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| const | -53,048 *** | -48,069 *** | -45,252 *** | -39,677 *** | -15,969 | -45,019 *** | -42,441 *** | -36,828 *** | -24,501 ** | -4,791 |
| | (11,839) | (11,514) | (11,541) | (13,646) | (12,098) | (9,567) | (9,455) | (9,241) | (10,847) | (9,104) |
| Adjusted $R^2$ | 0,474 | 0,522 | 0,530 | 0,528 | 0,767 | 0,647 | 0,696 | 0,718 | 0,724 | 0,888 |
| Number of observations | 204 | 174 | 174 | 174 | 102 | 204 | 174 | 174 | 174 | 102 |

Notes: *** 1%, ** 5%, * 10% significant level; heteroskedasticity robust standard errors are in the parentheses.
The variable l_PCGDPDIFF is the positive difference (zero otherwise) between the sending and the receiving country.

**Table 5 - Migrants networks and FDI - United Kingdom**

| **Dependent variable:** | **Outward FDI** | | | | | **Inward FDI** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Static models* | | | | *Dynamic model* | *Static models* | | | | *Dynamic model* |
| *Explanatory variables* | *Model 1* | *Model 2* | *Model 3* | *Model 4* | *Model 5* | *Model 6* | *Model 7* | *Model 8* | *Model 9* | *Model 10* |
| l_TGDP | 1,465 *** | 0,777 | 0,527 | 0,571 | -0,163 | 1,459 *** | 1,422 *** | 1,466 *** | 1,849 *** | 1,239 ** |
| | (0,499) | (0,559) | (0,531) | (0,562) | (0,431) | (0,479) | (0,533) | (0,509) | (0,506) | (0,584) |
| l_sq_GDPDIFF | -0,206 * | -0,112 | -0,114 | -0,119 | -0,008 | -0,218 ** | -0,223 ** | -0,199 * | -0,202 ** | -0,175 * |
| | (0,112) | (0,116) | (0,110) | (0,112) | (0,078) | (0,099) | (0,103) | (0,100) | (0,096) | (0,099) |
| l_PCGDPDIFF | -0,151 *** | -0,161 *** | -0,123 ** | -0,120 ** | -0,026 | 0,141 *** | 0,124 ** | 0,125 ** | 0,103 ** | 0,062 |
| | (0,049) | (0,054) | (0,052) | (0,054) | (0,045) | (0,047) | (0,052) | (0,050) | (0,048) | (0,059) |
| l_DIST | 0,508 *** | 0,474 ** | 0,311 | 0,312 | -0,097 | -1,227 *** | -1,152 *** | -0,971 *** | -1,055 *** | -0,580 |
| | (0,193) | (0,230) | (0,222) | (0,223) | (0,180) | (0,242) | (0,284) | (0,285) | (0,274) | (0,364) |
| l_OPENNESS | 0,064 | 0,168 | 0,402 | 0,395 | 0,082 | -2,051 *** | -1,994 *** | -1,235 ** | -1,086 * | -0,291 |
| | (0,302) | (0,367) | (0,353) | (0,356) | (0,293) | (0,415) | (0,502) | (0,577) | (0,553) | (0,677) |
| DUMMYEU15 | 1,221 ** | 0,685 | 0,382 | 0,375 | 0,100 | 0,759 * | 0,672 | 0,457 | 0,347 | 0,473 |
| | (0,484) | (0,526) | (0,505) | (0,508) | (0,409) | (0,441) | (0,448) | (0,440) | (0,422) | (0,508) |
| DUMMYOECD | 0,574 | 0,755 | 0,021 | 0,549 | 1,062 | -1,564 ** | -1,299 * | -1,287 * | 13,726 ** | 10,376 * |
| | (0,465) | (0,565) | (0,571) | (2,214) | (1,854) | (0,663) | (0,708) | (0,680) | (5,627) | (6,046) |
| DUMMYLANG | 1,109 *** | 0,528 | 0,410 | 0,432 | -0,111 | 2,031 *** | 1,989 *** | 1,146 | 1,011 | 0,696 |
| | (0,411) | (0,537) | (0,511) | (0,522) | (0,428) | (0,500) | (0,679) | (0,750) | (0,717) | (0,884) |
| DUMMYCOMMONWEALTH | -0,389 | -0,822 | -1,371 ** | -1,407 ** | -0,637 | 1,056 * | 0,917 | 0,873 | 1,129 * | 0,500 |
| | (0,448) | (0,568) | (0,559) | (0,580) | (0,475) | (0,618) | (0,633) | (0,608) | (0,588) | (0,753) |
| CHRISSHARE | -0,019 | -0,039 | 0,496 | 0,513 | -0,452 | -2,545 *** | -2,557 *** | -1,590 * | -1,632 * | -1,561 |
| | (0,459) | (0,572) | (0,561) | (0,568) | (0,455) | (0,744) | (0,810) | (0,874) | (0,834) | (0,999) |
| GOVERNANCE_Std | 0,610 | 0,694 | 1,513 | 1,593 | 0,204 | 6,986 *** | 6,922 *** | 6,589 *** | 6,877 *** | 2,742 |
| | (0,894) | (1,098) | (1,062) | (1,115) | (0,920) | (1,490) | (1,558) | (1,506) | (1,441) | (1,852) |
| l_IMMIGRANTS | | 0,504 *** | | | | | 0,012 | | | |
| | | (0,177) | | | | | (0,195) | | | |
| l_LOWSKILLED_IMMI | | | -0,779 ** | -0,775 ** | -0,324 | | | -0,727 ** | -0,681 ** | -0,526 |
| | | | (0,307) | (0,309) | (0,241) | | | (0,305) | (0,292) | (0,334) |
| l_SKILLED_IMMI | | | 1,552 *** | | | | | 1,092 ** | | |
| | | | (0,372) | | | | | (0,444) | | |
| l_SKILLED_IMMI_OECD | | | | 1,513 *** | 0,360 | | | | 0,944 ** | 0,629 |
| | | | | (0,406) | (0,340) | | | | (0,427) | (0,504) |
| l_SKILLED_IMMI_NONOECD | | | | 1,575 *** | 0,471 | | | | 2,508 *** | 1,769 ** |
| | | | | (0,385) | (0,326) | | | | (0,676) | (0,738) |
| Time dummies | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| const | -12,913 | -10,786 | -8,721 | -9,484 | 3,981 | 5,493 | 5,429 | -3,353 | -22,882 * | -16,052 |
| | (8,161) | (8,723) | (8,277) | (8,873) | (7,240) | (8,924) | (10,282) | (10,560) | (12,424) | (13,548) |
| Adjusted $R^2$ | 0,442 | 0,465 | 0,521 | 0,517 | 0,776 | 0,743 | 0,725 | 0,746 | 0,769 | 0,802 |
| Number of observations | 149 | 119 | 119 | 119 | 78 | 85 | 79 | 79 | 79 | 51 |

Notes: *** 1%, ** 5%, * 10% significant level; heteroskedasticity robust standard errors are in the parentheses.
The variable l_PCGDPDIFF is the positive difference (zero otherwise) between the sending and the receiving country.

## Appendix - List of partner countries

### Germany (years: 1991-2004)

| | | | |
|---|---|---|---|
| Algeria | Egypt | Liberia | Saudi Arabia |
| Argentina | El Salvador | Libyan Arab Jamahiriya | Serbia and Montenegro |
| Australia | Estonia | Liechtenstein | Singapore |
| Austria | Finland | Lithuania | Slovak Republic |
| Bangladesh | France | Luxembourg | Slovenia |
| Belarus | Ghana | Macedonia | South Africa |
| Belgium | Greece | Malaysia | Spain |
| Bolivia | Guatemala | Malta | Sri Lanka |
| Bosnia-Herzegovina | Honduras | Mexico | Sweden |
| Brazil | Hungary | Morocco | Switzerland |
| Bulgaria | Iceland | Netherlands | Syrian Arab Republic |
| Cameroon | India | New Zealand | Taiwan |
| Canada | Indonesia | Nicaragua | Tanzania, United Rep. Of |
| Chile | Iran (Islamic Rep. of) | Nigeria | Thailand |
| China | Ireland | Norway | Tunisia |
| Colombia | Israel | Pakistan | Turkey |
| Costa Rica | Italy | Panama | Ukraine |
| Côte d'Ivoire | Jamaica | Paraguay | United Kingdom |
| Croatia | Japan | Peru | United States |
| Cyprus | Kazakhstan | Philippines | Uruguay |
| Czech Republic | Kenya | Poland | Uzbekistan |
| Denmark | Korea, Rep. of (South) | Portugal | Venezuela |
| Dominican Republic | Latvia | Romania | Vietnam |
| Ecuador | Lebanon | Russian Federation | |

### Italy (years: 1990-2004)

| | | | |
|---|---|---|---|
| Albania | Egypt | Luxembourg | Slovenia |
| Algeria | France | Malaysia | South Africa |
| Argentina | Germany | Mexico | Spain |
| Australia | Greece | Morocco | Sweden |
| Austria | Hungary | Netherlands | Switzerland |
| Brazil | India | Norway | Thailand |
| Bulgaria | Indonesia | Philippines | Tunisia |
| Canada | Iran | Poland | Turkey |
| Chile | Ireland | Portugal | Ukraine |
| China | Israel | Romania | United Kingdom |
| Croatia | Japan | Russian Federation | United States |
| Czech Republic | Korea, Rep. of (South) | Singapore | Venezuela |
| Denmark | Libya | Slovak Republic | |

## Appendix - List of partner countries

### France (years: 1990, 1999)

| | | | |
|---|---|---|---|
| Albania | Cyprus | Lao People's Dem. Rep. | Romania |
| Algeria | Czech Republic | Latvia | Russian Federation |
| Angola | Denmark | Lebanon | Saudi Arabia |
| Argentina | Djibouti | Libyan Arab Jamahiriya | Senegal |
| Australia | Egypt | Lithuania | Singapore |
| Austria | Finland | Luxembourg | Slovak Republic |
| Belarus | Gabon | Madagascar | Slovenia |
| Belgium | Germany | Malaysia | South Africa |
| Benin | Greece | Mali | Spain |
| Bolivia | Guinea | Mauritania | Sri Lanka |
| Brazil | Haiti | Mauritius | Sweden |
| Bulgaria | Hong Kong | Mexico | Switzerland |
| Burkina Faso | Hungary | Morocco | Syrian Arab Rep. |
| Cambodia (Kingdom of) | Iceland | Netherlands | Taiwan |
| Cameroon | India | New Zealand | Thailand |
| Canada | Indonesia | Niger | Togo |
| Central African Republic | Iran (Islamic Rep. of) | Nigeria | Tunisia |
| Chad | Ireland | Norway | Turkey |
| Chile | Israel | Pakistan | Ukraine |
| China | Italy | Panama | United Kingdom |
| Colombia | Ivory Coast | Paraguay | United States |
| Comoros | Japan | Peru | Uruguay |
| Congo, Rep. of | Kazakhstan | Philippines | Venezuela |
| Congo, Dem. Rep. of the | Kenya | Poland | Vietnam |
| Costa Rica | Korea, Rep. of (South) | Portugal | |
| Croatia | Kuwait | Qatar | |

### United Kingdom (years: 1990, 1995, 2001)

| | | | |
|---|---|---|---|
| Australia | Finland | Latvia | Russian Federation |
| Austria | France | Lithuania | Singapore |
| Belgium | Germany | Luxembourg | Slovak Republic |
| Bermuda | Ghana | Malaysia | Slovenia |
| Brazil | Greece | Malta | South Africa |
| Canada | Hong Kong | Mauritius | Spain |
| Chile | Hungary | Mexico | Sweden |
| China | India | Netherlands | Switzerland |
| Colombia | Indonesia | New Zealand | Thailand |
| Cyprus | Ireland | Nigeria | Tunisia |
| Czech Republic | Italy | Norway | United States |
| Denmark | Japan | Panama | Zimbabwe |
| Egypt | Kenya | Poland | |
| Estonia | Korea, Rep. of (South) | Portugal | |