DOCUMENT DE TRAVAIL N° 579

INSTITUTIONAL DISTANCE AND FOREIGN DIRECT INVESTMENT

Rafael Cezar and Octavio R. Escobar

December 2015

BANQUE DE FRANCE
EUROSYSTÈME

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

INSTITUTIONAL DISTANCE AND FOREIGN DIRECT INVESTMENT

Rafael Cezar and Octavio R. Escobar

December 2015

Institutional Distance and Foreign Direct Investment

Rafael CEZAR[a], Octavio R. ESCOBAR[b]

[a] Banque de France. 37 rue du Louvre, 75002 Paris, France.
rafael.cezar@banque-france.fr

The views expressed in this paper are those of the author and do not necessarily reflect those of the Banque de France.

[b] Paris School of Business. 59 rue Nationale, 75013 Paris, France.
oescobar@esg.fr

Résumé : L'article étudie le lien entre les investissements directs étrangers (IDE) et la distance institutionnelle. Dans le cadre des firmes hétérogènes, nous développons un modèle théorique pour expliquer comment la distance institutionnelle influe sur les IDE, et il est montré que cette distance réduit à la fois la probabilité d'une entreprise d'investir dans un pays étranger et le volume des investissements qu'elle entreprendra. Nous testons le modèle à l'aide de données d'IDE entrants et sortants sur les pays de l'OCDE. Les résultats empiriques confirment la théorie et indiquent que l'activité des IDE diminue avec la distance institutionnelle. En outre, nous constatons que les entreprises des économies développées s'adaptent plus facilement à la distance institutionnelle que les entreprises des pays en développement.

Mots-clés : Investissements directs étrangers, Institutions, Firmes hétérogènes, Modèle de gravité

Classification JEL : F12, F23, H80, K20

Abstract: This paper studies the link between foreign direct investment (FDI) and institutional distance. Using a heterogeneous firms framework, we develop a theoretical model to explain how institutional distance influences FDI, and it is shown that institutional distance reduces both the likelihood that a firm will invest in a foreign country and the volume of investment it will undertake. We test our model using inward and outward FDI data on OECD countries. The empirical results confirm the theory and indicate that FDI activity declines with institutional distance. In addition, we find that firms from developed economies adapt more easily to institutional distance than firms from developing economies.

Keywords: Foreign direct investment, Institutions, Heterogeneous firms, Gravity model

JEL Classification: F12, F23, H80, K20

Non-technical summary:

The paper studies the link between foreign direct investments (FDI) and institutional distance. Using a heterogeneous firms' framework, we develop a theoretical model to explain how institutional distance influences decisions to invest in a foreign country and the volume invested. Multinational enterprises (MNEs) must adapt their strategies to local institutions when entering new foreign markets. And this strategy may differ from one country to another, depending on the host country institutions, and on the differences with the institutional framework that the investing firm is familiar. Our model suggests that MNEs face costs to adjust for the institutional environments of host countries, and that these costs increase with institutional distance. Therefore, institutional distance impacts the productivity threshold at which FDI is profitable and thus the number of multinational firms undertaking FDI. Furthermore, adaptation costs reduce FDI profitability such as the volume invested abroad declines with institutional distance.

Then we test our model using inward and outward FDI data on OECD countries. Using alternative indicators of institutional distance, the empirical results confirm the theory. They suggest that both the likelihood that a firm will invest and the volume of the FDI decrease as institutional distance increases. Moreover, the impact of institutional distance on OECD's FDI is stronger on inward flows than on outward flows. This shows that there is an asymmetry in bilateral flows between developed and developing countries. Perceived institutional distance from developed countries to developing countries and from the same developing to the developed country are not equal. Firms from developed countries can more easily cope with adaptation costs, which can explain why FDI flows from developed countries are larger than FDI flows from developing countries.

1. Introduction

Developing and transition economies increasingly attract foreign direct investment (FDI) flows (UNCTAD, 2012). Three important patterns, observable in UNCTAD (2012) data, are helpful in understanding this trend. First, most FDI outflows are from developed economies, but their share in total FDI outflows is decreasing over time. Since 2003, the share of FDI outflows of developing and transition economies has consistently increased, reducing the share of FDI from developed economies to approximately 75% in 2011. Second, firms primarily invest in countries with similar levels of development as their own. More than 70% of outward FDI from developing and transition economies goes to other developing and transition economies, and approximately 50% of this outward FDI goes to economies located in the source economy's region. Developed economies also locate most of their operations in other developed economies. Third, developed economies have a greater capacity to diversify their operations than developing and transition economies. Approximately 45% of outward FDI from developed economies goes to developing and transition economies. Moreover, developed economies are the main source of FDI in developing and transition economies.

Differences in the quality of institutions across countries are the main determinant of differences in economic development (Acemoglu and Robinson, 2010); we thus expect that institutional distance is an important determinant of FDI and that it helps explain recent FDI patterns. We develop a theoretical model, using a heterogeneous firms framework, to explain how institutional distance influences decisions to invest in a country and the volume of investment undertaken. According to the heterogeneous firms literature (Helpman et al., 2008; Yeaple, 2009), a productivity threshold must be overcome to make FDI profitable. Thus, only the most productive firms, mainly from developed countries, can invest abroad.

When entering foreign markets, multinational enterprises (MNEs) must adapt their strategies to the requirements of local institutions, which may differ from the institutions of their home countries. Our model suggests that MNEs face an adaptation cost in adjusting to the institutional environments of host countries. As adaptation costs increase with institutional distance, institutional distance determines the productivity threshold at which FDI is more profitable than exporting as a means of accessing foreign markets. Thus, increasing institutional distance reduces the number of firms that undertake FDI. In addition, adaptation costs reduce firm profits and the profitability of FDI. Accordingly, firms' FDI declines with institutional distance.

Firms perform better in foreign markets similar to their home markets than in markets that are dissimilar, as similarities are easier for firms to manage (Johanson and Vahlne, 2009). In addition to institutional similarities, development, geographical and cultural proximity are important determinants of FDI (Head and Ries, 2008; Helpman et al., 2008; Guiso et al., 2009). To control for differences in all of these factors across countries, when studying the determinants of FDI, the empirical literature uses gravity equations. Studies show that institutional distance matters for bilateral FDI. Differences between host and source countries in terms of corruption (Habib and Zurawicki, 2002), legal rules (Guiso et al., 2009), credit market regulations, legal constraints in recruiting and firing, and decentralisation of wage bargaining (Bénassy-Quéré et al., 2007) reduce bilateral FDI flows. However, the costs of

institutional distance may differ for firms from developed and developing countries, owing to firm heterogeneity. Firms from developed countries may have more experience and better networks, which reduce the cost of institutional distance, than firms from developing countries (Johanson and Vahlne, 2009).

We proceed to an empirical validation of our model. Using alternative indicators of institutional distance, the results suggest that FDI activity declines as institutional distance increases. When investing in countries with weak institutions, firms from countries with weak institutions face lower costs than firms from countries with strong institutions. The results also suggest that institutional distance more strongly influences firms' decisions to invest in developing than in developed economies. Once an investment decision is made, institutional distance equally affects the amount of investment from developed and developing economies.

This paper is organised as follows. Section 2 presents the theoretical model. Section 3 describes the empirical specification of the model and the estimation strategy. Section 4 describes the data and the measures of institutional distance used. The empirical results are presented in Section 5, and robustness tests are presented in Section 6. Finally, Section 7 concludes.

2. The model

This theoretical section illustrates how institutional distance impacts FDI patterns. The model is based on the heterogeneous firms framework, as in Melitz (2003), and on the international firms' trade-off framework between exporting and engaging in FDI, as developed by Helpman et al. (2004) and Yeaple (2009). We suggest that institutional distance impacts FDI transactional costs such that the decreasing of this distance reduces the amount needed to perform the international investment and more firms are able to produce abroad instead of exporting. We first present the background theory, and the subsequent subsection introduces the role of institutional distance in the model.

The world economy features i countries with N firms in a monopolistic competition market. Consumer constant elasticity of substitution (ε) utility preferences are identical across countries. The demand for variety ω is $q_i^d(\omega) = \frac{p_i(\omega)^{-\varepsilon}}{P_i^{1-\varepsilon}} Y_i$, and $P_i = (\int p_i(\omega)^{1-\varepsilon} d\omega)^{1/(1-\varepsilon)}$ is the ideal price index. Labour is the only input, and firms are heterogeneous in their productivity levels, noted as φ. The cdf (cumulative distribution function) of φ, identical across countries, is $\mu(\varphi)$ with support $[\varphi_B, \varphi_H]$, where $\varphi_H > \varphi_B > 0$, and φ_B and φ_H indicate the productivity levels of the least and most productive firms, respectively. Labour costs, noted w_i for country i, are country specific, and the marginal cost is w_i/φ.

Firms wishing to sell their products abroad chose between exporting or performing FDI. There are two specific costs to exporting: fixed costs, noted by f_{ij} for the country pair i, j, and variable costs, modelled as iceberg transportation costs, with $\tau_{ij} \geq 1$. The marginal cost of exporting from country i to j is $\tau_{ij} w_i/\varphi$. FDI allows firms to reduce transportation costs, but they incur higher fixed costs. The marginal cost of FDI is $w_j/\varphi < \tau_{ij} w_i/\varphi$, and the fixed cost is $F_{ij} > f_{ij}$.

Firms are assumed to use FDI neither as an export platform nor for outsourcing production but only to access the host country's market. From demand and price equations, the revenue from FDI can be represented as $r_{ij}(\varphi) = \left(\alpha P_j\right)^{\varepsilon-1} Y_j m(\varphi)^{1-\varepsilon}$, where $m(\varphi)$ is the marginal cost of a firm with productivity φ. The variable FDI revenue is thus $R_{ij}(\varphi) = \frac{r_{ij}}{\varepsilon} = \psi_j m(\varphi)^{1-\varepsilon}$, where $\psi_j = \frac{\left(\alpha P_j\right)^{\varepsilon-1}}{\varepsilon} Y_j$ is specific to country j and measures demand adjusted for the elasticity of substitution. Let us define $\pi_x(\varphi)_{ij}$ and $\pi_I(\varphi)_{ij}$ as export and FDI profits, respectively:

$$\begin{aligned} \pi_x(\varphi)_{ij} &= \psi_j\left(\tau_{ij} w_i\right)^{1-\varepsilon} \varphi^{\varepsilon-1} - f_{ij} \\ \pi_I(\varphi)_{ij} &= \psi_j {w_j}^{1-\varepsilon} \varphi^{\varepsilon-1} - F_{ij} \end{aligned} \qquad (1)$$

Marginal costs are decreasing in φ, and thus, $R_{ij}(\varphi)$, and profits are increasing in φ. Firms only sell abroad if profits are at least zero, and we have two productivity thresholds: φ_x and φ_I, such that $\pi(\varphi_x)_{ij} = 0$ and $\pi(\varphi_I)_{ij} = 0$. The first threshold indicates the productivity level above which firms generate sufficient variable income to pay fixed export costs. The second is the productivity threshold above which firms can pay for fixed FDI costs.

The variable income for MNEs – and their marginal profit – is always higher than the marginal income of exporting firms $\left(\frac{\delta\pi_I(\varphi)}{\delta\varphi} > \frac{\delta\pi_x(\varphi)}{\delta\varphi}\right)$. However, because fixed FDI costs are higher than fixed export costs, the productivity threshold above which firms will export is typically lower than the productivity threshold for FDI. Firms choose the internationalisation mode that maximises their profits. For example, they prefer FDI only if $\pi_I(\varphi) \geq \pi_x(\varphi)$. We denote the productivity of the marginal MNE firm as φ_I^*. This productivity threshold is country-pair specific, and all firms in country i with productivity above φ_I^* produce directly in country j.

Because productivity levels are not directly observable, $r_{ij}(\varphi)$ is used as a proxy for this FDI threshold (which is an increasing function of φ). From Equation 1, the income level above which firms from country i invest (and produce) in country j is

$$r\left(\varphi^*_{I\,ij}\right) = \varepsilon \frac{\left(F_{ij} - f_{ij}\right)}{1 - \left(\frac{\tau_{ij} w_i}{w_j}\right)^{1-\varepsilon}}. \qquad (2)$$

Because productivity follows $\mu(\varphi)$, only the fraction $\left(1 - \mu\left(\varphi^*_{I\,ij}\right)\right)$ of the N_i firms from i invest in j. Moreover, it is possible that this proportion equals zero if $\varphi^*_{I\,ij} > \varphi_H$, with no firm sufficiently profitable to reach the threshold. The equation indicates that an increase in the difference between F_{ij} and f_{ij} makes exports relatively more attractive than FDI. Moreover, because the ratio between marginal costs is always greater than one, $\left(\frac{\tau_{ij} w_i}{w_j}\right)^{1-\varepsilon}$ is less than one. Therefore, $\varphi^*_{I\,ij}$ is larger when the distance between $\tau_{ij} w_i$ and w_j is small.

2.1. Institutional distance and FDI margins

Firms face two types of fixed FDI costs: i) construction of new facilities and ii) adaptation costs, which are the costs required to produce in the institutional, political and economic environment of the host country.

Firms' demand rises as prices fall, and prices decrease as firm productivity rises. Therefore, MNEs' demand depends on productivity, and the most productive firms face the highest demand. Subsequently, the size of the facilities that multinationals construct in the host country is proportional to their productivity level, with the most productive firms building the largest facilities. This indicates that the cost of investing in new facilities is a function of expected profits in the host market.[1] For simplicity, the investment cost function is assumed to be monotone and linear. The cost for firms of country i of opening a subsidiary in country j is $w_j \theta \pi_{ij}(\varphi)$, where the parameter θ is positive and strictly less than one, and π_{ij} is defined as in Equation 1. The fixed cost of investing in new facilities depends on firm productivity.

The second fixed FDI cost is the adaptation investment in the new institutional environment. To produce in the host country, firms must adapt to its legal system, tax laws, political and governmental framework, conditions of access to credit, and regulations. Such adaptation costs depend on the institutional framework of the host country. Countries with weak institutional environments have high adaptation costs, while improvements in the institutional environment lower these costs (Daude and Stein, 2007). Nevertheless, firms are already accustomed to the institutional environments of their own domestic markets and have experience in coping with them. Such experience can reduce adaptation costs, especially when the institutional environments of the country-pair are similar (Bénassy-Quéré et al., 2007; Guiso et al., 2009; Habib and Zurawicki, 2002). Thus, we assume that adaptation costs are inversely proportional to institutional proximity. A firm accustomed to a weak institutional environment finds it easier to invest in a country with similar characteristics, while the same firm needs to make larger investments to adapt to a country with an efficient but different institutional system.

Let λ_i denote the level of institutional development of country i. This parameter measures the overall institutional quality of the country, including regulations, property rights, access to information, financial constraints, level of corruption, and political stability, as well as the formalities involved in opening a business, executing a contract, and registering a property. Thus, the cost of institutional adaptation between countries i and j is an increasing function of the distance between λ_i and λ_j. When this distance is tight, firms in country i are familiar with the institutional environment in country j, and adaptation costs are low. Inversely, a large distance indicates high adaptation costs.

We denote this adaptation cost as $w_i c(\lambda_j - \lambda_i)$, and it is measured in labour cost units of the source-country. The cost function is specific to the country-pair, is monotone, is strictly

[1] An alternative explanation would be that the return on capital is calculated based on the sum of actualised expected profits.

positive and increases with institutional distance, such as $\frac{\delta c(\lambda_j-\lambda_i)}{\delta(\lambda_j-\lambda_i)} > 0$. Thus, the fixed cost of engaging in FDI in j from i is $F_{ij} = w_j\theta\pi_{ij}(\varphi) + w_i c(\lambda_j-\lambda_i)$. From Equations 2 and the FDI fixed cost above, the income threshold above which firms in country i perform FDI in country j is

$$r(\varphi^*_{I\,ij}) = \varepsilon \frac{w_j\theta\pi_{ij}(\varphi)+w_i c(\lambda_j-\lambda_i)-f_{ij}}{1-\left(\frac{\tau_{ij}w_i}{T_{ij}w_j}\right)^{1-\varepsilon}}. \quad (3)$$

This equation indicates a direct and negative relationship between institutional distance and the marginal variation in the proportion of firms that engage in FDI (extensive margin), such that $\frac{\delta\varphi^*_{I\,ij}}{\delta(\lambda_j-\lambda_i)} \approx \frac{\delta r(\varphi^*_{I\,ij})}{\delta(\lambda_j-\lambda_i)} > 0$, where $\delta\varphi^*_{I\,ij}/\delta(\lambda_j-\lambda_i)$ is the elasticity of the FDI productivity threshold with respect to institutional distance. This elasticity is positive, such that a positive change in $(\lambda_j-\lambda_i)$ increases $\varphi^*_{I\,ij}$ and reduces the proportion of MNEs (extensive margin).[2] This relationship is summarised in the following proposition:

Proposition 1: *There is a direct and negative relationship between institutional distance and the marginal variation in the extensive margin, such that an increase in this distance raises the productivity threshold above which FDI is profitable and reduces the proportion of MNE.*

To examine how institutional distance affects the volume of FDI flows between countries (intensive margin), we define below V_{ij} as the average productivity of firms from country i that invest in j:

$$V_{ij} = \begin{cases} \int_{\varphi^*_{I\,ij}}^{\varphi_H} \varphi^{\varepsilon-1} d\mu(\varphi) & if \quad \varphi^*_{I\,ij} \le \varphi_H \\ 0 & if \quad \varphi^*_{I\,ij} > \varphi_H \end{cases} \quad (4)$$

If $\varphi^*_{I\,ij} > \varphi_H$, $V_{ij} = 0$ because no firm from i is sufficiently productive to invest in j; and if $\varphi^*_{I\,ij} \le \varphi_H$, at least one firm is sufficiently productive to invest abroad. This variable is country-pair specific, with $V_{ij} \neq V_{ji}$, which allows for asymmetric FDI flows. The intensive margin (the volume of FDI between two countries) is the sum of all investments made by each firm (for which $\varphi \ge \varphi^*_{I\,ij}$) in the construction of new facilities.[3] From the FDI fixed cost and Equation 4, the total FDI from i to j can be written as:

$$\begin{aligned} FDI_{ij} &= w_j\theta\pi_{ij}(\varphi)V_{ij}N_i \\ &= \left(\frac{(1-w_j\theta)w_j\theta}{1-(w_j\theta)^2}\right)\left(\psi_j(T_{ij}w_j)^{1-\varepsilon}\varphi^{\varepsilon-1} - w_i c(\lambda_j-\lambda_i)\right)V_{ij}N_i \end{aligned} \quad (5)$$

[2] Because the model focuses on the productivity threshold, for simplicity, we assume that the distribution of φ is the same across countries. Nevertheless, dropping this hypothesis – which agrees with the real condition of firms' productivity – allows, together with unilateral FDI costs, for asymmetric FDI flows between country pairs. These two factors can also explain the unilateral FDI flow between a country pair.

[3] Because the adaptation cost is incurred in the source country before investments are complete, FDI exclusively concerns investments in new facilities.

This equation indicates that the cost of institutional adaptation has a negative effect on the value of FDI, such that a positive change in the first variable reduces FDI. $c(\lambda_j - \lambda_i)$ also affects the number of investing firms via the productivity threshold, which is included in V_{ij}. Based on these observations, the second theoretical proposition is presented as follows:

Proposition 2: *Institutional distance negatively affects the intensive margin of FDI, such that an increase in institutional distance reduces FDI flows.*

3. Empirical specification

The gravity equation is commonly used to study the determinants of FDI, as they can be derived from various theoretical models (Head and Ries, 2008; Kleinert and Toubal, 2010, 2013). We develop a gravity equation to test the propositions of our model. First, our model suggests that institutional distance influences decisions to invest abroad (the extensive margin). Second, the model suggests that institutional distance influences the profitability of foreign investment and the volume of investment (the intensive margin). Because the volume of investment depends on the extensive margin, we develop, following Helpman et al. (2008), a two-stage gravity equation to estimate the extensive and intensive margins. In the first stage, or the selection equation, firms choose whether to invest (extensive margin); in the second stage, or the primary equation, firms that invest decide how much to invest (intensive margin).

3.1 Empirical specification of the selection equation

From Equation 4, the decision to invest depends on firms' productivity and on the productivity threshold. We define the variable Z_{ij} as the ratio of the productivity of the most productive firm (φ_H) to the productivity threshold ($\varphi^*_{I\,ij}$). If $Z_{ij} > 1$, then firms from country i invest in country j. We assume that the productivity of the most productive firm (φ_H) in country i is given; thus, variations in Z_{ij} are caused by changes in the threshold at which FDI is more profitable than exports. Therefore, the estimation of Z_{ij} allows us to estimate the impact of institutional distance on the productivity threshold ($\varphi^*_{I\,ij}$) and the decisions of firms to invest abroad:

$$Z_{ij} = \left(\frac{\varphi_H}{\varphi^*_{I\,ij}}\right)^{\varepsilon-1} = \frac{\left(\frac{(\alpha P_j)^{\varepsilon-1}}{\varepsilon} Y_j\right)\left({w_j}^{1-\varepsilon} - (\tau_{ij} w_i)^{1-\varepsilon}\right)}{F_{ij} - f_{ij}} \varphi_H^{\varepsilon-1} \quad . \tag{6}$$

We assume that differences in fixed and variable costs between exporting and FDI are stochastic. More precisely, we suppose that ${w_j}^{1-\varepsilon} - \left(\tau_{ij} w_i\right)^{1-\varepsilon} \equiv \exp(\vartheta_1 w_i + \vartheta_2 w_j + \vartheta_3 X_i + \vartheta_4 M_j + \vartheta_5 \Upsilon_{ij} + \epsilon_{ij})$, where X_i is a measure of the costs of exporting, such as customs procedures and regulations in country i, and is independent from the export destination; M_j is a measure of trade barriers, such as customs procedures and regulations, imposed by the importing country j on all exporters; Υ_{ij} measures country-pair characteristics, such as bilateral distance and ease of communication; and $\epsilon_{ij} \sim \mathrm{N}(0, \sigma_\epsilon^2)$ is an error term. With respect to

differences in fixed costs, we assume that $F_{ij} - f_{ij} \equiv \exp(\beta_1 w_i + \beta_2 w_j + \beta_3 c(\lambda_j - \lambda_i) + \xi_{ij})$, where $\xi_{ij} \sim \mathrm{N}(0, \sigma_\xi^2)$ is an error term. We can express Equation 6 in log form as

$$z_{ij} = \gamma_0 + \gamma_i + \gamma_j + \gamma_{ij} + \eta_{ij}, \tag{7}$$

where $z_{ij} = \ln(Z_{ij})$; $\gamma_0 = (\varepsilon - 1)\ln(\alpha) - \ln(\varepsilon)$ is a constant; $\gamma_i = (\varepsilon - 1)\ln(\varphi_H) + (\vartheta_1 + \beta_1)w_i + \vartheta_3 X_i$ represents the characteristics of the source country i; $\gamma_j = (\varepsilon - 1)\ln(P_j) + \ln(Y_j) + (\vartheta_2 + \beta_2)w_j + \vartheta_4 M_j$ represents the characteristics of the host country j; $\gamma_{ij} = \vartheta_5 Y_{ij} + \beta_3 c(\lambda_j - \lambda_i)$ represents the characteristics of the country-pair i, j; and $\eta_{ij} = \epsilon_{ij} + \upsilon_{ij} \sim N(0, \sigma_\epsilon^2 + \sigma_\xi^2)$ is an independent and identically distributed (iid) error term.

We cannot measure z_{ij} because neither firms' productivity levels nor the productivity threshold are observable. However, the presence of firms from country i in country j implies that $z_{ij} > 0$. A selection indicator S_{ij} is generated, using a latent variable such as $S_{ij} = 1$ if firms from i invest in j and $S_{ij} = 0$ otherwise. Let ρ_{ij} be the probability that country i invests in j, conditional on the observed variables. Assuming $\sigma_\eta^2 = \sigma_\epsilon^2 + \sigma_\upsilon^2 = 1$, we can specify Equation 7 as a probit equation:

$$\begin{aligned} \rho_{ij} &= \Pr(S_{ij} = 1 | \text{Observed variables}) \\ &= \Phi(\gamma_0 + \gamma_i + \gamma_j + \gamma_{ij} + \eta_{ij}) \end{aligned}, \tag{8}$$

where $\Phi(\cdot)$ is the cumulative distribution function of the unit-normal distribution. We then estimate the predicted value of z_{ij} as $\hat{z}_{ij} = \Phi^{-1}(\hat{\rho}_{ij})$. It is important to note that the selection equation above is derived from firm-level decisions. It shows how changes in the characteristics of the countries affect FDI decisions. More specifically, marginal changes in the characteristics of country i or j modify the productivity threshold and affect the choice between exporting or performing FDI. Equation 8, then, provides information on the marginal variation in the proportion of firms from i investing in j.

3.2 Empirical specification of the primary equation

FDI flows from country i to j, given by Equation 5, can be expressed in log form as $\ln(FDI_{ij}) = \theta + \ln(w_j) + \ln(\pi_{ij}) + \ln(V_{ij}) + \ln(N_i)$. Profits ($\pi_{ij}$) depend on demand as well as on production and implantation costs. Thus, we estimate the following equation

$$\ln(FDI_{ij}) = \phi + \phi_i + \phi_j + \phi_{ij} + v_{ij} + u_{ij}, \tag{9}$$

where ϕ_i, ϕ_j, and ϕ_{ij} are the characteristics of country i, country j, and country-pair i, j, respectively; $v_{ij} = \ln(V_{ij})$ is the logarithm of the average productivity level of firms from i that invest in j; and $u_{ij} \sim \mathrm{N}(0, \sigma_u^2)$ is an error term. From Equations 2, following Helpman et al. (2008), we specify $v_{ij} \equiv v(z_{ij})$ as an arbitrary increasing function of z_{ij}. More precisely, we control for $\mathrm{E}[V_{ij}|., S_{ij} = 1]$, using $v(\hat{z}_{ij})$, which we approximate with a cubic polynomial in $\hat{z}_{ij}$.

3.3 Estimation strategy

Equations 8 and 9 include common exogenous variables specific to the FDI source country i, host country j, and country-pair i, j. GDP per capita proxies for wage levels, geographical and cultural distance proxy for trade and coordination costs, and country size or GDP levels proxy for demand. These proxies enable us to construct a gravity equation for both the selection and primary equations. The literature suggests that under general equilibrium, bilateral FDI depends on the same exogenous determinants as bilateral trade flows (Bergstrand and Egger, 2007; Egger, 2010).

Although the exogenous variables included in the selection and primary equations may be identical, an additional variable not included in the primary equation is also required in the selection equation (Wooldridge, 2002). In addition, incorporating panel data estimates from the selection equation into the primary equation entails potential autocorrelation bias. We follow Wooldridge (2002), who proposes estimating the selection equation for each year t and using the resulting estimates to compute $\hat{z}_{ij}$. This procedure is similar to the two-stage estimators of Heckman (1979); however, we only control for firms' heterogeneity, not for selection bias. To address zero flow observations, we employ the Santos-Silva and Tenreyro (2010) Poisson pseudo-maximum-likelihood (PPML) estimator.

4. Data

We construct a panel database of the bilateral relationships between 31 OECD countries and 125 countries in different stages of economic development. Data are available for the 2004-2009 period. The dependent variable is the ratio of the bilateral stock of FDI – inward into and outward from OECD countries – to the GDP of the FDI receiving country.[4] Data come from the International Direct Investment Statistics database, available from the OECD, and from the World Development Indicators (WDI) of the World Bank.

4.1. Institutional distance index

Different institutional frameworks and their impact on economic activity have received substantial attention in the recent literature on FDI (Bénassy-Quéré et al., 2007; Guiso et al., 2009). Generally, the term "institution" refers to structures that affect economic relations. North (1994) defines institutions as the constraints built by men and designed to organise social relations. Formal constraints include regulations, property rights, the financial system and contract enforcement (Levchenko, 2007), while informal constraints include levels of social trust (Algan and Cahuc, 2010) and corruption (Habib and Zurawicki, 2002).

[4] FDI stock data are widely used in the literature. The most frequent arguments used to justify the use of FDI stock data are as follows: (i) FDI is also financed by markets in the host country, and therefore, stock data provide a more accurate measure than flow data; (ii) Stock is much less volatile than flows; and (iii) Stock data greatly reduce the number of zero observations in the sample.

A measure of the distance between institutional environments must therefore be sensitive to various aspects of the institutional structures of each country. Thus, a wide range of indicators of various formal and informal constraints is used to construct a single composite index for each country in the sample, using principal component analysis (PCA). The institutional indexes of countries i and j are denoted by λ_i and λ_j. The institutional distance between two countries is then calculated from the composite index and equals the absolute value of the difference between two countries' indices: $Dist_{ij} = |\lambda_i - \lambda_j|$.

4.1.1. Principal component analysis

Principal component analysis is used to construct the composite institutional index. This method allows for a set of multivariate observations to be described by a linear combination of these observations so as to maximise the variance explained by the new variable. Specifically, the original variables $x_{1i}, \dots, x_{ni}$ are transformed into a new variable y, such that the variance of y in the total sample is maximal. In other words, the weighting coefficients of the first component maximise the variance and minimise the loss of information from the original sample.[5]

We estimate the institutional index using the first component of the analysis. This component alone explains approximately 68% of the total variance in the sample constructed,[6] a high level of explanatory power that fully justifies the use of this component to summarise the information contained in the various selected variables.

4.1.2. Institutional data

We use 13 indicators of the efficiency of *structures that affect economic relations* to measure the functioning of the economic and institutional environment. Two different composite indicators are constructed from the combination of these variables, and one distance measure is constructed for each indicator (see Table 1).

The first institutional index we construct is composed of six indicators. Four of these indicators measure the quality of governments and their policies: corruption index, government effectiveness, political stability, and regulatory quality. The first captures the extent to which public power is exercised for private gain. The second is sensitive to the quality of public services, their independence from political pressure and the credibility of government commitments. Political stability indicates views about the probability that a government could be destabilised or overthrown by unconstitutional or violent means. The final indicator measures the ability of government to formulate and implement policies and regulations that promote development of the private sector. These indicators are made available by the World Governance Indicators project of the World Bank. Two additional variables, which also

[5] Because the growth of these coefficients increases the variance indefinitely, the sum of the squared coefficients is constrained to equal unity. Furthermore, to address the different scales and units of the variables, the initial sample is centred-reduced, such that the mean is equal to zero and the standard deviation is equal to one.

[6] For index 1, 68%; 40% in index 2.

measure the quality of regulatory policy and the institutional environment faced by firms and their access to information, are employed in the construction of this first index. Credit rights measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus the functioning of the credit market. The Information index measures rules affecting the scope, accessibility, and quality of information available through either public or private credit registries. These two variables are made available by the Doing Business project of the World Bank.

The second institutional index is composed of the six indicators presented below and seven others.[7] Three of the indicators concern bureaucratic practices and laws imposed on businesses: the costs of executing a contract, of registering a property and of starting a business. Two other indicators measure trade institutions: cost to export and cost to import, both measured as cost per container in U.S. dollars. These five indicators are provided by the World Bank's Doing Business project. An additional indicator is employed to measure governments' protectionist policies, namely, the simple mean applied tariff rate, as a percentage of price, for all traded goods. This indicator is calculated in the Global Development Indicators, using data from the Trade Analysis and Information System of the United Nations and the Integrated Data Base of the World Trade Organization. The seventh measure used is the private credit to GDP ratio, which indicates the financial resources provided to the private sector through loans, purchases of non-equity securities, and trade credits. This variable indicates financial constraints in the economy and is provided by the International Monetary Fund.[8]

4.2 Control variable data

The control variables included in the model are commonly used in the literature. They are the GDP per capita of both the source (i) and the host (j) country; the GDP similarity, measured as $\frac{GDP_i GDP_j}{(GDP_i+GDP_j)^2}$ (Bergstrand and Egger, 2007); the geographical distance between the two countries; and dummies for contiguity, common language, colonial ties, and bilateral investment treaty. The GDP and GDP per capita (in PPP USD) data are from the World Bank WDI database. Geographical distance and dummies for contiguity, common language, and colonial ties are from CEPII's databases. Finally, the bilateral investment treaty dummy is constructed from UNCTAD's IIA databases. This variable equals one if a bilateral investment treaty between the two countries is in force and zero otherwise.

[7] The main criterion used in selecting variables and in their division into the two composite indexes is the availability of data.

[8] An increase in all 13 indicators employed in both indexes indicates development of the institutional environment, such that an increase in the two composite indexes proposed in this section indicates an improvement in institutional quality. Nevertheless, this is not the objective of this exercise, which is mainly to measure the difference in institutional environments across countries.

5. Results

Our model suggests that institutional distance reduces both the extensive and intensive margins of FDI. This section presents empirical results that verify the propositions of the model, using two alternative datasets. The first uses data on OECD countries' outward FDI, while the second uses data on the OECD countries' inward FDI. We find differences between the determinants of outward and inward FDI, differences that help explain the contrasting patterns of FDI outflows between developing and developed countries.

5.1 Determinants of OECD countries' outward FDI

First, we nominated an exogenous variable correlated with the selection indicator S_{ij}, but not with FDI stocks. Column 1 of Table 2 shows that the contiguity and colonial tie dummy variables are good candidates, as they are not significantly correlated with FDI. The estimates of the probit model indicate that the colonial tie dummy variable is significantly correlated with the selection indicator, but the contiguity dummy is not. Thus, we use the colonial tie dummy variable as an exogenous variable in the selection equation and not in the primary equation.

Column 2 presents the probit estimates of the selection equation, or the extensive margin. The results indicate that GDP per capita in the source country, similarity in size between the countries, common language, colonial ties, and a bilateral investment treaty increase the number of firms from country i investing in country j, but geographical and institutional distance reduce this number. This result is robust to estimates based on the second index of institutional distance (column 4).

The probit estimates provide information regarding the main determinants of the extensive margin. However, using these estimates can lead to serious bias when estimating the primary equation, or the intensive margin (Wooldridge, 2002). We estimate the parameter for the number of MNEs from country i in country j ($\hat{z}_{ij}$), using different probit estimates for each year t. We then add $\hat{z}_{ij}$ to the primary equation to estimate the determinants of the amount of FDI, or the intensive margin. Column 3 presents the results for the primary equation, using the first index of institutional distance. On the one hand, bilateral FDI increases in the number of investing firms ($\hat{z}_{ij}$), GDP per capita of both the source and host countries, similarity in size and common language. On the other hand, bilateral FDI declines with both geographical and institutional distance. Like the probit estimates, the PPML estimates are quite similar for the second index of institutional distance presented in column 5.

The results show similar determinants of the intensive margin (selection equation) and the extensive margin (primary equation). However, the extensive margin is more sensitive to similarities in GDP level, common language, and institutional distance, but less sensitive to geographical distance and bilateral investment treaty. GDP per capita of the host country is not significant for the intensive margin but is significant for the extensive margin. However, similar GDP levels are more important than the host country's GDP per capita.

5.2 Determinants of OECD countries' inward FDI

We proceed to estimate the results using inward FDI instead of outward FDI. The results are presented in Table 3. First, we identify an exogenous variable correlated with S_{ij} and not with FDI_{ij}. Column 1 indicates that the colonial ties dummy is not correlated with FDI. Thus, we use the colonial ties variable as an exogenous variable in the selection equation, but we exclude it from the primary equation.

Columns 2 and 4 present the probit estimates of the selection equation. The likelihood that a firm from country i invests in country j increases with similarities in size and culture, but this likelihood decreases with geographical and institutional distance. The results are robust to changing the institutional index. Institutional distance reduces the number of firms that engage in FDI, as suggested by the model.

We estimate $\hat{z}_{ij}$ using different probit estimates for each year t; we then add $\hat{z}_{ij}$ to the primary equation to estimate the determinants of FDI volume. Columns 3 and 5 indicate that FDI volume also increases in the number of MNEs, GDP per capita of the host country, similarities in size between the source and host countries and common language but declines in geographical and institutional distance. Among these variables, only GDP per capita is not correlated with the selection indicator. More importantly, the extensive margin is more sensitive than the intensive margin to GDP and language similarities but less sensitive to geographical distance. The difference in sensitivity to institutional distance between the two margins is, however, small.

5.3 Institutional distance and FDI patterns

The results, presented in Tables 2 and 3, highlight similarities and differences in the patterns of outward and inward FDI. GDP per capita of the host economy increases the volume of FDI but does not affect the likelihood that new firms will engage in both outward and inward FDI. Average income in the host economy appears to increase the profitability of investment, which encourages firms to undertake the largest investments in the most developed countries.

GDP per capita of the source country is very important in outward FDI of OECD countries but insignificant in inward FDI. The wealthiest OECD countries are present in more countries and invest larger amounts than less developed OECD countries. OECD countries also attract FDI from various locations but not necessarily from the most developed countries.

Similarities in economic size and culture increase both the number of investing firms and the volume of FDI. Similarity of GDP levels is, however, a stronger determinant of inward FDI than of outward FDI. As OECD countries are among the largest economies in the world, this result suggests that among non-OECD countries, differences in the investment capacities between small and large countries are larger than differences in the abilities of small and large countries to attract FDI from OECD countries.

As our model suggests, institutional distance influences which firms will engage in FDI, or the extensive margin. However, the costs of institutional distance for developed and developing

countries are asymmetric. OECD inward FDI is more sensitive to institutional distance than OECD outward FDI. According to our model, institutional distance is a cost that increases the productivity threshold above which FDI is profitable. As firms from non-OECD countries are on average less productive than firms from OECD countries, the probability that the productivity of such firms will exceed the productivity threshold is lower than for firms from OECD countries.

The theoretical model proposes that institutional distance also reduces the profitability of investment and the volume of FDI undertaken. The empirical results validate this proposition. In addition, our results show that the sensitivity of FDI volume to institutional distance is similar for OECD and non-OECD firms. The effect of institutional distance on the profitability of investment is thus similar for OECD and non-OECD countries.

6. Robustness

This section presents results that validate the importance of institutional distance. First, we control for the host country's institutional quality. Finally, we analyse the effects of distance on different indicators of institutional quality.

6.1 Sensitiveness to host country's institutional quality

The results presented in the previous section show that institutional distance reduces both the probability of bilateral FDI and the amount of bilateral FDI flows and that the effects of institutional distance differ between inward FDI and outward FDI for OECD countries. However, because there is less heterogeneity in the OECD source countries' institutional quality than in the host economy (see Figure 1), we might wonder if most of the effects of institutional distance come from the institutional quality of the host countries. Moreover, the literature highlights the importance of the host country's institutional quality in attracting FDI flows (Bénassy-Quéré et al., 2007; Daude and Stein, 2007). Thus, we include the host country's institutional quality variable to the empirical specification.

Table 4 presents the estimates for the new specification using institutional index 1. Columns 1 and 2 present the results for outward FDI, and columns 3 and 4 present the results for inward FDI. Concerning outward FDI, the host country's institutional quality is not significant for either the extensive or intensive margins when controlling for institutional distance. Moreover, the institutional distance estimates presented in columns 1 and 2 do not differ from those presented in Table 2. These results confirm the intuition of our model that adaptation costs are lower with similarities in countries' institutional quality.

Concerning inward FDI determinants, Table 4 columns 3 and 4 present the estimates for both the extensive and intensive margins. The estimates for the institutional distance variable are still significant, and the values of their coefficients are nearly the same as those presented in Table 3. Concerning the host country's institutional quality, the results suggest that "low" institutional quality increases the likelihood that new firms will engage in FDI activity, but it

does not influence the amount of the investment. Hence, this result confirms that it is more difficult for countries with poor institutional quality to adapt to a good institutional environment than those with a good institutional quality.

6.2 Distance of alternative institutional variables

In previous sections, we employed a composite institutional index to measure institutional quality. In this subsection, we study the aspects of institutions that matter individually. Hence, we estimate the model using institutional distance separately for each of the 13 variables used to compute the composite institutional indexes. Table 5 presents estimates for different institutional quality indicators. To conserve space, we present only estimates for those institutional distance variables that have at least one significant estimate. Note that each estimate is obtained for different regressions, but to conserve space, they are presented in the same column according to the dependent variables.

Table 5 shows that the extensive and intensive margins are influenced differently according to the type of institution. There are also differences between the outward and inward FDI of OECD countries. Distance in corruption reduces the probability of new FDI, but it has no influence on the amount of FDI. Distance in protectionist policy, on the other hand, has a negative influence on FDI intensity, but not on the extensive margin. The extensive margin is more sensitive to different types of institutional distance. Distances in government effectiveness and in the cost of executing a contract negatively influence the amount of outward FDI, while the amount of inward FDI is negatively influenced by the distance in information index.

Among the institutional dimensions included in our study, private credit and regulatory quality are significant to most of the specifications. Distance in private credit reduces both the extensive and intensive margins of outward FDI, but only the intensive margin of inward FDI. This result is similar to the findings of Bénassy-Quéré et al. (2007), who find that the amount of FDI is negatively influenced by differences in credit market regulation. Distance in regulatory quality is the only variable that negatively impacts the extensive and intensive margins for both inward and outward FDI. Hence, we can deduce that regulatory quality is one of the most important dimensions of institution quality, as previously found by Daude and Stein (2007).

7. Conclusion

We propose a theoretical model to explain the impact of institutional distance on FDI. We assume that institutional distance imposes a cost on investors. Precisely, investors must interact with foreign institutions to obtain credit and complete administrative, bureaucratic, and legal procedures when investing abroad; institutional proximity increases the expertise available to cope with these procedures. The model suggests that institutional distance influences both the decision to invest abroad (extensive margin) and the volume of investment a firm undertakes (intensive margin). As adaptation costs increase with institutional distance

between source and host countries, institutional distance determines the productivity threshold at which FDI is more profitable than exporting as a means of entering a foreign market. Increases in institutional distance raise this threshold and the number of firms that undertake FDI decreases. Institutional distance also affects the total volume of FDI undertaken by the source country in the host economy by affecting the extensive margin and firms' profitability.

We conduct an empirical investigation to validate our model, using data on FDI of OECD countries. Using alternative indicators of institutional distance, the results suggest that both the extensive and intensive margins of FDI decrease as institutional distance increases. Institutional distance plays an important role in FDI. First, institutional distance reduces the number of firms for which FDI is sufficiently profitable that they prefer exporting over this mode of implantation. Second, institutional distance reduces the profitability of FDI such that the amount of firms' FDI decreases with this distance.

Institutional distance has differing effects on OECD countries' outward and inward FDI. In particular, institutional distance is more important for OECD countries' inward FDI than for their outward FDI. This indicates that there is an asymmetry in bilateral FDI flows between developed and developing countries. Perceived institutional distance from a developed country to a developing country and from the same developing to the developed country are not equal. Firms from developed countries can more easily cope with the costs of institutional distance, which explains why FDI flows from developed countries are larger than FDI flows from developing countries.

In addition to institutional distance, differences in economic size and in geographical and cultural distance discourage FDI. To date, therefore, proximity has been a major determinant of bilateral FDI. Because cultural and economic proximity cannot be modified in the short run, authorities in developing countries should focus on improving institutions to improve FDI performance.

References

Acemoglu, D. & Robinson, J. (2010). The Role of Institutions in Growth and Development. *Review of Economics and Institutions*, 1(2), Article 1. doi:10.5202/rei.v1i2.1.

Algan, Y. & Cahuc, P. (2010). Inherited Trust and Growth. *American Economic Review*, 100(5), 2060–2092.

Bénassy-Quéré, A., Coupet, M. & Mayer, T. (2007). Institutional Determinants of Foreign Direct Investment. *The World Economy*, 30(5), 764–782.

Bergstrand, J. H. & Egger, P. (2007). A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises. *Journal of International Economics*, 73(2), 278–308.

Daude, C. & Stein, E. (2007). The quality of institutions and foreign direct investment. *Economics & Politics*, 19, 317–344.

Egger, P. (2010). Bilateral FDI potentials for Austria. *Empirica*, 37(1), 5–17.

Guiso, L., Sapienza, P. & Zingales, L. (2009). Cultural Biases in Economic Exchange? *Quarterly Journal of Economics*, 124(3), 1095–1131.

Habib, M. & Zurawicki, L. (2002). Corruption and Foreign Direct Investment. *Journal of International Business Studies*, 33(2), 291–307.

Head, K. & Ries, J. (2008). FDI as an outcome of the market for corporate control: Theory and evidence. *Journal of International Economics,* 74(1), 2–20.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica* 47(1), 153–161.

Helpman, E., Melitz, M. & Rubinstein, Y. (2008). Estimation trade flows: trading partners and trade volumes. *The Quarterly Journal of Economics*, 123 (2), 441–487.

Helpman, E., Melitz, M. & Yeaple, S. (2004). Export Versus FDI with Heterogeneous Firms. *American Economic Review*, 94(1), 300–316.

Johanson, J. & Vahlne, J. (2009). The internationalization process of the firm - a model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, 40(9), 1411–1431.

Kleinert, J. & Toubal, F. (2010). Gravity for FDI. *Review of International Economics,* 18(1), 1–13.

Kleinert, J. & Toubal, F. (2013). Production versus distribution-oriented FDI. *Review of World Economics/Weltwirtschaftliches Archiv*, 149(3), 423–442.

Levchenko, A. (2007). Institutional Quality and International Trade. *Review of Economic Studies*, 74(3), 791–819.

Melitz, M. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695–1725.

North, D. (1994). Economic Performance Through Time. *American Economic Review*, 84(3), 359–368.

Santos-Silva, J. M. C. & Tenreyro, S. (2010). On the existence of the maximum likelihood estimates in Poisson regression. *Economics Letters,* 107, 310–312.

UNCTAD (2012). *World Investment Report 2012: Towards a New Generation of Investment Policies*. United Nations Conference on Trade and Development (UNCTAD). New York and Geneva: United Nations publication.

Yeaple, S. (2009). Firm heterogeneity and the structure of U.S. multinational activity. *Journal of International Economics*, 78(2), 206–215.

Wooldridge, J.M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Figure 1. Distribution of institutional index 1 for outward FDI.

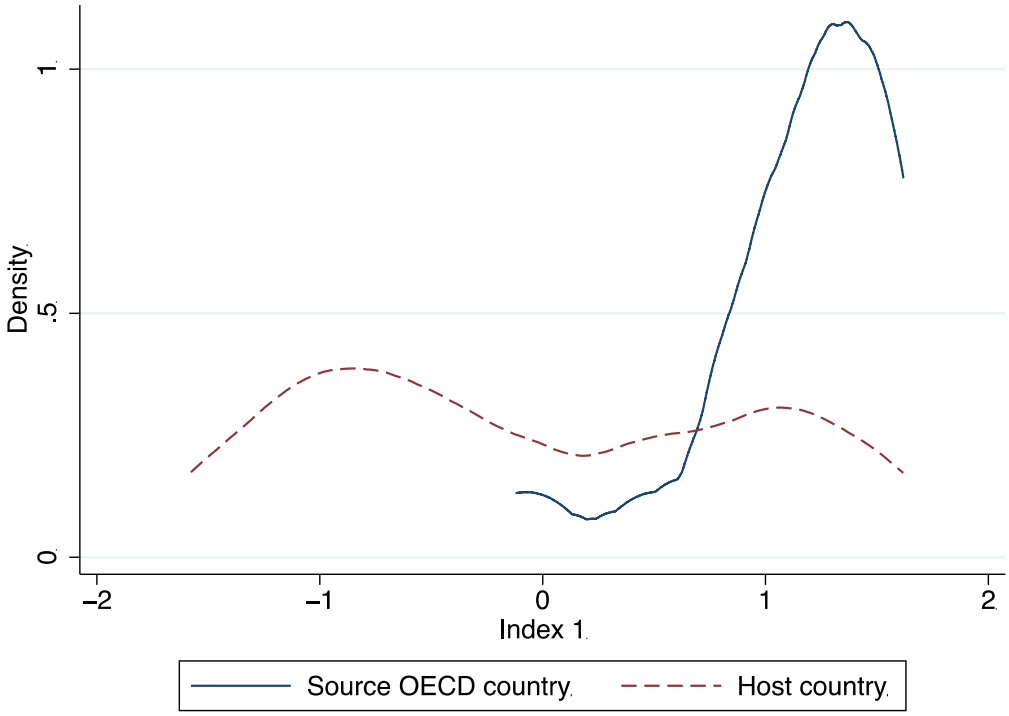

Table 1. Institutional indexes

Variables	*Index 1*	*Index 2*
Corruption	Yes	Yes
Government effectiveness	Yes	Yes
Political stability	Yes	Yes
Regulatory quality	Yes	Yes
Credit rights	Yes	Yes
Information index	Yes	Yes
Cost to execute a contract		Yes
Cost to register a property		Yes
Cost to start a business		Yes
Cost to export		Yes
Cost to import		Yes
Protectionist policy		Yes
Private credit		Yes

Table 2. Extensive and intensive margins of outward FDI

Estimation method:	*PPML*	*Probit*	*PPML*	*Probit*	*PPML*
Dependent variable:	FDI_{ij}	S_{ij}	FDI_{ij}	S_{ij}	FDI_{ij}
	(1)	(2)	(3)	(4)	(5)
GDP per capita source	2.273 **	2.434 **	2.663 **	2.432 **	2.612 **
	(0.868)	(0.504)	(0.984)	(0.510)	(0.963)
GDP per capita host	1.143 **	-0.160	1.163 **	-0.094	1.106 **
	(0.245)	(0.255)	(0.264)	(0.259)	(0.255)
GDP similarity	0.171 **	0.164 **	0.215 **	0.161 **	0.234 **
	(0.054)	(0.037)	(0.051)	(0.037)	(0.049)
Geographical distance	-0.482 **	-0.695 **	-0.395 **	-0.696 **	-0.403 **
	(0.062)	(0.045)	(0.051)	(0.046)	(0.053)
Contiguity dummy	-0.020	-0.114	0.036	-0.101	0.024
	(0.151)	(0.230)	(0.132)	(0.233)	(0.129)
Common language	0.675 **	0.369 **	0.716 **	0.366 **	0.668 **
dummy	(0.132)	(0.094)	(0.116)	(0.094)	(0.110)
Colonial tie dummy	0.231	1.113 **		1.116 **	
	(0.138)	(0.146)		(0.147)	
Bilateral investment treaty	0.116	0.231 **	-0.014	0.229 **	-0.027
dummy	(0.114)	(0.052)	(0.115)	(0.052)	(0.114)
Institutional distance					
Index 1		-0.062 *	-0.098 **		
		(0.024)	(0.027)		
Index 2				-0.065 *	-0.093 **
				(0.027)	(0.026)
$\hat{z}_{ij}$			1.148 **		1.147 **
			(0.147)		(0.152)
$\hat{z}_{ij}^2$			-0.437 **		-0.436 **
			(0.102)		(0.103)
$\hat{z}_{ij}^3$			0.057 **		0.057 **
			(0.018)		(0.019)
Observations	23,064	22,755	22,755	22,476	22,476
R-squared	0.88		0.89		0.89

Notes: * Significant at 5%, ** significant at 1%. Standard errors robust to country-pair clustering recorded in parentheses. Each regression includes a constant. Time, source-country and host-country dummies are not reported. Reported R-squared values for probit regressions correspond to pseudo R-squared values.

Table 3. Extensive and intensive margins of inward FDI

Estimation method:	*PPML*	*Probit*	*PPML*	*Probit*	*PPML*
Dependent variable:	FDI_{ij}	S_{ij}	FDI_{ij}	S_{ij}	FDI_{ij}
	(1)	(2)	(3)	(4)	(5)
GDP per capita source	0.782	-0.363	0.911	-0.357	0.950
	(0.727)	(0.259)	(0.734)	(0.263)	(0.712)
GDP per capita host	2.285**	0.691	2.277**	0.794	2.218**
	(0.576)	(0.503)	(0.602)	(0.507)	(0.569)
GDP similarity	0.332**	0.251**	0.364**	0.252**	0.380**
	(0.064)	(0.039)	(0.066)	(0.039)	(0.064)
Geographical distance	-0.473**	-0.606**	-0.439**	-0.605**	-0.463**
	(0.057)	(0.044)	(0.047)	(0.045)	(0.047)
Contiguity dummy	0.215	-0.058	0.226	-0.068	0.164
	(0.129)	(0.196)	(0.121)	(0.197)	(0.123)
Common language	0.528**	0.469**	0.572**	0.469**	0.545**
dummy	(0.132)	(0.102)	(0.128)	(0.102)	(0.109)
Colonial tie dummy	0.167	0.682**		0.690**	
	(0.117)	(0.144)		(0.145)	
Bilateral investment treaty	-0.185	0.179**	-0.168	0.182**	-0.169
dummy	(0.176)	(0.055)	(0.169)	(0.055)	(0.168)
Institutional distance					
Index 1		-0.086**	-0.074*		
		(0.026)	(0.029)		
Index 2				-0.113**	-0.109**
				(0.028)	(0.028)
$\hat{z}_{ij}$			1.137**		1.122**
			(0.200)		(0.205)
$\hat{z}_{ij}^2$			-0.616**		-0.609**
			(0.131)		(0.132)
$\hat{z}_{ij}^3$			0.094**		0.093**
			(0.023)		(0.023)
Observations	23,064	22,755	22,755	22,476	22,476
R-squared	0.90		0.90		0.91

Notes: * Significant at 5%, ** significant at 1%. Standard errors robust to country-pair clustering recorded in parentheses. Each regression includes a constant. Time, source-country and host-country dummies are not reported. Reported R-squared values for probit regressions correspond to pseudo R-squared values.

Table 4. Effects of institutional distance on FDI controlled by institutional quality of the host country

Estimation method:	*Probit*	*PPML*	*Probit*	*PPML*
Dependent variable:	*outward* S_{ij}	*outward* FDI_{ij}	*inward* S_{ij}	*inward* FDI_{ij}
	(1)	(2)	(3)	(4)
GDP per capita source	2.435**	2.669**	-0.373	0.902
	(0.505)	(0.986)	(0.258)	(0.734)
GDP per capita host	-0.113	1.016**	1.141*	2.737**
	(0.264)	(0.329)	(0.511)	(0.617)
GDP similarity	0.164**	0.215**	0.251**	0.364**
	(0.037)	(0.051)	(0.039)	(0.066)
Geographical distance	-0.695**	-0.395**	-0.607**	-0.439**
	(0.045)	(0.051)	(0.044)	(0.047)
Contiguity dummy	-0.114	0.036	-0.058	0.225
	(0.230)	(0.132)	(0.196)	(0.121)
Common language dummy	0.369**	0.716**	0.469**	0.573**
	(0.094)	(0.116)	(0.102)	(0.128)
Colonial tie dummy	1.113**		0.684**	
	(0.146)		(0.145)	
Bilateral investment treaty dummy	0.231**	-0.014	0.180**	-0.168
	(0.052)	(0.115)	(0.055)	(0.169)
Institutional distance (Index 1)	-0.063*	-0.098**	-0.087**	-0.075*
	(0.025)	(0.027)	(0.026)	(0.029)
Institutional index 1 host	-0.086	0.194	-0.535**	-0.537
	(0.118)	(0.177)	(0.085)	(0.290)
$\hat{z}_{ij}$		1.148**		1.136**
		(0.147)		(0.200)
$\hat{z}_{ij}^2$		-0.436**		-0.616**
		(0.102)		(0.131)
$\hat{z}_{ij}^3$		0.057**		0.094**
		(0.018)		(0.023)
Observations	22,755	22,755	22,755	22,755
R-squared		0.89		0.90

Notes: * Significant at 5%, ** significant at 1%. Standard errors robust to country-pair clustering recorded in parentheses. Each regression includes a constant. Time, source-country and host-country dummies are not reported. Reported R-squared values for probit regressions correspond to pseudo R-squared values.

Table 5. Effects of different institutional distance indicators on FDI

Estimation method:	Probit	PPML	Probit	PPML
Dependent variable:	outward S	outward FDI	inward S	inward FDI
	(1)	(2)	(3)	(4)
Distance in:				
Corruption	-0.085**	-0.040	-0.061*	-0.060
	(0.025)	(0.033)	(0.025)	(0.031)
Government effectiveness	-0.033	-0.050*	-0.053	-0.016
	(0.028)	(0.020)	(0.028)	(0.021)
Regulatory quality	-0.121**	-0.091**	-0.115**	-0.068**
	(0.026)	(0.022)	(0.027)	(0.025)
Information index	-0.011	-0.016	0.008	-0.034**
	(0.006)	(0.011)	(0.007)	(0.010)
Cost to execute a contract	-0.002	-0.035*	-0.021	-0.023
	(0.021)	(0.017)	(0.020)	(0.015)
Cost to register a property	0.014	-0.022	0.033*	-0.055
	(0.016)	(0.032)	(0.016)	(0.033)
Protectionist policy	-0.006	-0.066*	-0.029	-0.087**
	(0.015)	(0.027)	(0.016)	(0.031)
Private credit	-0.100**	-0.056**	-0.036	-0.053**
	(0.021)	(0.017)	(0.022)	(0.017)

Notes: * Significant at 5%, ** significant at 1%. Standard errors robust to country-pair clustering recorded in parentheses. We compute each estimate separately from different regressions. Each regression also includes control variables used in previous estimates. A constant as well as time, source-country and host-country dummies are not reported. Reported R-squared values for probit regressions correspond to pseudo R-squared values.

Documents de Travail

560. M. Bas, T. Mayer and M. Thoenig, "From Micro to Macro: Demand, Supply, and Heterogeneity in theTrade Elasticity" June 2015

561. J. Acalin, B. Cabrillac, G. Dufrénot, L. Jacolin and S. Diop, "Financial integration and growth correlation in Sub-Saharan Africa" June 2015

562. L. Gauvin and C. Rebillard, "Towards Recoupling? Assessing the Global Impact of a Chinese Hard Landing through Trade and Commodity Price Channels" July 2015

563. L. Chauvet and H. Ehrhart, "Aid and Growth. Evidence from Firm-Level Data" July 2015

564. M. Bürker and G. A. Minerva, "Civic capital and the Vertical Integration of Service Provision: Evidence from Italy" July 2015

565. S. Roux, "Approches structurelles et non structurelles en micro-économétrie de l'évaluation des politiques publiques" August 2015

566. G. Levieuge, "Explaining and forecasting bank loans. Good times and crisis" August 2015

567. G. Levieuge, "Cohérence et contenu prédictif des indicateurs du Bank Lending Survey pour la France" August 2015

568. P. Clerc, "Credible Wage Bargaining and the Joint Dynamics of Unemployment and Inflation" August 2015

569. H. Guimbard and M. Le Goff, "Mega-deals: What Consequences for sub-Saharan Africa?" September 2015

570. G. Verdugo, "Real Wage Cyclicality in the Eurozone before and during the Great Recession: Evidence from micro data" September 2015

571. M. Bussière, L. Ferrara and J. Milovich, "Explaining the Recent Slump in Investment: the Role of Expected Demand and Uncertainty" September 2015

572. M. Albert, C. Jude and C. Rebillard, "The Long Landing Scenario: Rebalancing from Overinvestment and Excessive Credit Growth. Implications for Potential Growth in China" October 2015

573. P. Andrade, G. Gaballo, E. Mengus and B. Mojon, "Forward Guidance and Heterogeneous Beliefs" October 2015

574. C. Jadeau, E. Jousselin, S. Roux and G. Verdugo, "The behaviour of French Firms during the Crisis: Evidence from the Wage Dynamics Network Survey" October 2015

575. C. Berson and N. Ferrari, "Financial incentives and labor market duality" October 2015

576. K. Istrefi and B. Vonnak, "Delayed Overshooting Puzzle in Structural Vector Autoregression Models" October 2015

577. S. Avouyi-Dovi and J-G. Sahuc, "On the sources of macroeconomic stability in the euro area" November 2015

578. F. Canova, F. Ferroni and C. Matthes, "Approximating time varying structural models with time invariant structures" December 2015

579. R. Cezar and O. R. Escobar, "Institutional distance and foreign direct investment" December 2015

Pour accéder à la liste complète des Documents de Travail publiés par la Banque de France veuillez consulter le site : www.banque-france.fr

For a complete list of Working Papers published by the Banque de France, please visit the website: www.banque-france.fr

Pour tous commentaires ou demandes sur les Documents de Travail, contacter la bibliothèque de la Direction Générale des Études et des Relations Internationales à l'adresse suivante :

For any comment or enquiries on the Working Papers, contact the library of the Directorate General Economics and International Relations at the following address :

BANQUE DE FRANCE
49- 1404 Labolog
75049 Paris Cedex 01
tél : 0033 (0)1 42 97 77 24 ou 01 42 92 63 40 ou 48 90 ou 69 81
email : 1404-ut@banque-france.fr