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ABSTRACT

The Location of Domestic and Foreign Production Affiliates by French Multinational Firms*

Economists explaining location choices of foreign affiliates usually focus on country-level determinants. Costs of production, the size of expected demand, proxies for agglomeration effects, and various policy-related incentives form the usual set of covariates. Two dimensions of those choices are usually omitted. Multinational enterprises (MNEs) usually have more than one affiliate abroad and they also continue to invest domestically during their international expansion. We add to the literature on location choice by accounting for i) the entire network of affiliates of each French MNE over the 1992-2002 period, and ii) the entire set of possible choices by including the home country. Our results show that the interdependence between affiliates of the same MNE matters a great deal for location, both for the choice between different foreign countries and for the choice between investing at home or abroad. Moreover, French firms' propensity to invest abroad is shown to be positively linked to their productivity and the size of their intangible assets.

JEL Classification: F12 and F15
Keywords: conditional logit model, location choice and multinational firms

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1 Introduction

The extent, determinants and effects of outward investment is a topic of great anxiety in developed countries. When continental Europe is primarily concerned by the possible disappearance of its manufacturing base, the United States and the United Kingdom sound more worried about offshoring of services. Those fears can actually lead to drastic changes in policy decisions. For instance, a survey conducted by Eurobarometer (2005) indicates that the fear of offshoring was the first reason that French citizens invoked for rejecting the European Constitutional Treaty in May 2005.[1] Two different strands of academic literature try to describe and quantify the phenomena behind those fears. First, some studies focus on the direct measurement of the impact of outward FDI on different domestic performance variables such as output, productivity or employment. Navaretti and Venables (2004) survey results by this type of work, which dominantly concludes to the small magnitude of the employment effects in particular. One of the most recent trend of such work (see Castellani and Navaretti, 2004, for Italian firms or Debaere et al. 2006, for South Korean ones) is the use of score propensity matching techniques to compare investing firms to most similar national firms in terms of employment outcome. Again, results seem to favor small effects at best.

A second, more indirect, type of studies examines determinants of location choices, in order to quantify the share of different motives for outward FDI identified in the theory of foreign investment. The horizontal (driven by market access) versus vertical (motivated by production costs differentials) divide of FDI motives still provide the most popular framework for analysis. More sophisticated approaches have been introduced recently with the knowledge capital model (Markusen, 2002) or the complex integration model (Yeaple, 2003), which propose an integrated framework of the two core drivers. The empirical literature on this issue also has quite clear results, with often a largely dominant role for market access over simple costs considerations. This finding corroborates the ones on the estimated effects of FDI, since vertical FDI is the one expected to most directly affect job market and wages in the home country.

Our paper tries to add to this second literature by addressing one of the most pressing question about offshoring, whether investment abroad by multinational firms substitutes for investment at home. Using firm-level data on French investments both in France and abroad over the 1992-2002 period, we investigate the determinants of location choice, and assess empirically whether the domestic economy is loosing attractiveness over the recent period, as often claimed in the public debate about offshoring in rich countries. With respect to previous firm-level investigations of FDI decisions, our value-added is the use of data covering both domestic plant creations and investments in a large set of foreign countries that makes it possible to investigate the decision to invest abroad rather than in France and the location choice abroad, conditional on having decided to become a multinational company. Previous related estimations typically focus on only one aspect of the decision process: The choice between exporting and making FDI in Brainard (1997) and Head and Ries (2003) for instance or the conditional location choice in, among many others, Coughlin *et al.* (1991), Head *et al.* (1999), Guimarães et al. (2000) or Head and Mayer (2004). A notable exception is Devereux and Griffith (1998), that model US firms strategies in European markets as a sequential process involving i) the choice of serving the European market, ii) the trade-off between exporting from the USA or investing in Europe and iii) the choice of a precise European country, conditional on having decided to invest in the zone. Our work is close to theirs in spirit, although our data cover a much larger set of foreign locations, relates more closely to theory, and adds a number of determinants of firms' choices. In particular, the data available allows to envision those location choices in a broader perspective, where the whole geographical structure of the firm is taken into account. We build in particular a financial network variable describing the strength of financial linkages that a given investor has in each country of the world (including France) due to previous investments there. This determinant turns out to be an important one in subsequent location decisions, and also a key factor in explaining the differences between investment at home and investment abroad.

The remainder of the paper is organized as follows: Section 2 provides our theoretical motivation, mostly based on recent applications of New Economic Geography (NEG) modeling to location choices of production affiliates. It is particularly related to Head and Mayer (2004) and Amiti and Javorcik (2006). It also uses recent advances of the literature explaining FDI decisions by firm-specific features, as its productivity (Helpman *et al.*, 2004) or its intangible assets (Markusen, 2002). Section 3 presents the data used and a descriptive analysis of the proposed determinants of location choice. Section 4

[1] Even though the relationship between the treaty and offshoring is rather unclear.

gives results of location choice estimates for investment abroad, which enables comparison with previous papers, whereas Section 5 adds domestic investment. Section 6 concludes.

2 Theory and empirical implementation

While the first papers explaining location choices of foreign affiliates mostly relied on reduced form estimation, progress in econometric specification has recently been made, mostly inspired by the theoretical work in New Economic Geography initiated by Krugman (1991) and synthesized in Fujita et al. (1999). Our theoretical framework builds on Head and Mayer (2004) and Amiti and Javorcik (2006) that describe the expected profits of an affiliate in each of the prospective locations and compare them to get insight about the equilibrium number of affiliates in each alternative country (Amiti and Javorcik, 2006) or the probability for a firm to invest in a given location (Head and Mayer, 2004). Our innovation is to integrate in this framework results by Helpman *et al.* (2004) and Markusen (2002) explaining the choice between domestic and foreign investments.

In our theoretical framework, the operating profits of affiliates have two main components: i) Access to relevant markets in terms of demand and ii) various components of production costs among which the price of intermediates and local wages. In addition to those determinants of operating profits, investing firms are assumed to incur a fixed cost needed in order to start any operation. As in Helpman *et al.* (2004), this fixed cost is assumed to be higher if the firm invests abroad than for a domestic investment. This hypothesis accounts for the fact that information on a country is easier to gather when you live in it, which reduces the fixed cost to create a new affiliate. Because of this asymmetry between domestic and foreign investments, the location decision is naturally divided into two stages: The decision to invest domestically or abroad and the choice of a location, given the fact the firm invests abroad.

To estimate such a two-stage discrete choice model, the nested logit method is frequently used (Train, 2003). This method accounts for the possibility that substitution patterns are not the same across all alternatives. To this aim, it partitions the set of alternatives into several "nests" and assumes nest-specific substitution patterns across alternatives. In our framework, there are two nests: Either the investing firm creates an affiliate in its own country (nest "dom" in the following) or it locates its affiliate abroad (nest "fdi"). Under this nested tree structure, the location choice can be decomposed into two steps, the choice of a nest and the choice of a location inside the chosen nest. This decomposition is explained in the following section, before detailing the determinants affecting each step of the decision process.

2.1 The nested logit model

To derive the choice probabilities in the sequential discrete choice process we are considering, it is convenient to decompose the nested model into two logit functions. To this aim, the profit function that the decision maker (the investing firm) f expects from an investment in location i is split into: i) a component W that is constant for all alternatives within a nest and ii) a component Y that varies over alternatives within a nest:

$$\Pi_i(f) = Y_i(f) + W_k(f) + \varepsilon_i(f)$$

with $k(= \text{fdi}, \text{dom})$ an index designating the nest to which location i belongs, and $\varepsilon_i(f)$ an error term which marginal distribution is univariate extreme value.

In the following, it is assumed that firm f chooses the location i that maximizes expected profits $\Pi_i(f)$. The probability for country i to be chosen as a location can then be expressed as the product of two probabilities, the probability $P_k(f)$ that an alternative within nest k is chosen (also called the *upper model*) and the conditional probability $P_{i|k}(f)$ for location i to be chosen among the different potential locations constituting the chosen nest (the *bottom model*):

$$P_i(f) = P_{i|k}(f)P_k(f) \tag{1}$$

With the specified logistic error structure, McFadden (1978) showed that each of those probabilities can be expressed using the information contained in $W_k(f)$ and $Y_i(f)$, with nest-specific variables used to explain the choice of a nest and location-specific ones explaining the conditional probability:

$$P_k(f) = \exp(W_k(f) + \rho_k IV_k(f) - I\tilde{V}(f)) \tag{2}$$

$$P_{i|k}(f) = \exp(Y_i(f)/\rho_k - IV_k(f)) \tag{3}$$

with $IV_k(f) \equiv \ln \sum_{j \in k} \exp(Y_j(f)/\rho_k)$ and $I\tilde{V}(f) \equiv \ln \sum_k \exp\left[W_k(f) + \rho_k IV_k(f)\right]$.

In this expression of the choice probability, $IV_k(f)$ is the "inclusive value" of nest k and sums up the expected profit that firm f receives from the choice of a location in nest k. Its introduction in the upper model brings information from the bottom model, reflecting the fact that the choice of a nest depends on the expected profit received from any location in that nest. On the other hand, $I\tilde{V}(f)$ summarizes the profit expected from both nests, which serves as the denominator in the choice probability $P_k(f)$.

Note that in the particular case we are considering, one of the nests is constituted of a single location, France. The inclusive value is then: $IV_{\text{dom}}(f) = Y_{\text{dom}}(f)/\rho_{\text{dom}}$ and it is no more possible to identify separately the "log-sum" coefficient ρ_{dom}. In the following then, we constraint both log-sum coefficients to equality and estimate it using the variablity of $Y_i(f)$ within the nest of foreign locations. This estimated coefficient is related to the correlation in unobserved factors within each nest and gives us an insight on the relevance of the assumed tree structure. As shown by Train (2003), this probability can be estimated by maximum likelihood techniques using information on the variables entering the profit function. In the following, we adopt a backward estimation procedure[2]: we first estimate the bottom model using information contained in $Y_i(f)$, then we compute the inclusive value of each nest that is introduced with variables entering $W_k(f)$ in the estimation of the upper model. To this aim, we only need to specify $Y_i(f)$ and $W_k(f)$.

2.2 Variables included in the bottom model

In this section, we describe the variables entering $Y_i(f)$, used to estimate the probability of a particular country within the nest of foreign locations ($P_{i|\text{fdi}}(f)$). We follow Head and Mayer (2004) and Amiti and Javorcik (2006) and compare operating profits across locations. Indeed, as long as the fixed cost of investing abroad is uniform across *foreign* countries, the location chosen, conditional on investing abroad, turns out to be the country maximizing expected operating profits.

Assuming standard monopolistic competition with CES utility and iceberg trade costs, operating profits can be written:

$$\pi_i^{op}(f) = \frac{C_i(f)^{1-\sigma}}{\sigma} \text{MA}_i \tag{4}$$

where $C_i(f)$ represents the variable cost incurred by an affiliate of firm f located in country i. $\sigma > 1$ is the traditional Dixit-Stiglitz elasticity of substitution.

MA_i denotes the market access of country i, which summarizes the expected demand for the product sold by f in the different j markets accessible from an affiliate located in country i. It involves the expenditure in each market j (E_j), weighted by ease of access to market j from country i ($0 < \phi_{ij} < 1$), and competition faced on j (negatively related to the CES price index P_j). Standard derivation of the Dixit-Stiglitz-Krugman monopolistic competition model yields (4) with $\text{MA}_i \equiv \sum_j \phi_{ij} E_j P_j^{\sigma-1}$ (the precise derivation can be found in Head and Mayer, 2004). Redding and Venables (2004) show how to estimate a theory-consistent version of MA_i from bilateral trade data, a method we also use later in this paper.

Let us suppose that variable costs are a function of a composite firm/country-specific cost variable and a firm-specific component of total factor productivity (*i.e.* $C_i(f) = v_i(f)/A(f)$). Firm f's factor productivity does not affect the location choice as we assume that it does not depend upon the nationality of its plant. As a consequence, only the firm/country-specific part of variable costs $v_i(f)$ enters $Y_i(f)$.

These firm/country-specific variables include production costs and transaction costs ($TC_i(f)$). The latter capture the fact that it is probably easier for a French investor to run a business in a proximate, francophone or ex-colonial country.[3] Those advantages are identical for all French investors, but there might be some firm-specific information / transaction costs differences across countries. In particular, a firm investing in an area where a large number of other firms from the same financial group already invested will probably benefit from lower costs there, everything else equal. We construct a firm-level financial network variable to account for this type of effect.

[2] As shown by Train (2003), this gives consistent (though not efficient) estimates of the parameters.

[3] These transaction costs might also take the form of fixed costs. Since their effect is statistically significant in the regressions, it however seems that at least part of their influence on location decisions operates through the firm's marginal cost.

Production costs depend on local wages w_i and the price of intermediates the affiliate incorporates in its production process. In the following, the intermediate price index is assumed to depend on a supply access variable $\mathrm{SA}_i(f)$ which summarizes the expected supply of (domestically produced or imported) intermediate goods the affiliate is able to buy from country i. As explained in Section 3 and following Amiti and Javorcik (2006), the computation of $\mathrm{SA}_i(f)$ takes into account both the technology used by firm f (which influences its affiliate's input use) and trade costs incurred in shipping intermediates to i.

Incorporating these variable costs into equation (4), we obtain the reduced form of firm f's operating profits expected from location i. From this, we get the location-specific variables entering the bottom part of the nested model:

$$Y_i(f) = \beta_0 + \beta_1 \ln \mathrm{MA}_i(f) + \beta_2 \ln \mathrm{SA}_i(f) + \beta_3 \ln w_i + \beta_4 \ln TC_i(f) \tag{5}$$

The first econometric step consists in running the "bottom" model on the set of foreign locations, which allows to compute IV_{fdi}. We also estimate on the full sample of investments, including domestic ones. Adding a "France" dummy, one can then assess whether there is something specific about domestic investments justifying the use of a nested tree. As explained above, a more rigorous approach is to consider differences between domestic and foreign investments in a more structural way, using the nested logit model. To this aim, we however need to explicit the decision to invest abroad rather than in France ($P_{\mathrm{fdi}}(f)$).

2.3 Variables included in the upper model

To obtain the variables included in $W_k(f)$, we use Helpman *et al.*'s arguments that firms investing abroad are those that can afford to pay the higher fixed cost of FDI instead of producing domestically and exporting. With respect to the monopolistic competition framework used in the previous section, their model adds an option to invest in a domestic affiliate and assumes the fixed cost of investing to be higher for a foreign than for a domestic investment ($F_{\mathrm{fdi}}(f) > F_{\mathrm{dom}}(f)$). Under this assumption, only the firms whose productivity is higher than a given threshold $\bar{A}$ optimally choose to invest abroad to save on trade costs incurred when exporting their product. The productivity threshold $\bar{A}$ is defined as the productivity level that makes a firm indifferent between investing domestically or abroad, $\pi^{op}_{\mathrm{fdi}}(\bar{A}, v_{\mathrm{fdi}}(f), MA_{\mathrm{fdi}}) - F_{\mathrm{fdi}}(f) = \pi^{op}_{\mathrm{dom}}(\bar{A}, v_{\mathrm{dom}}(f), MA_{\mathrm{dom}}) - F_{\mathrm{dom}}(f)$:

$$\bar{A}^{\sigma-1} = \frac{\sigma(F_{\mathrm{fdi}}(f) - F_{\mathrm{dom}}(f))}{v_{\mathrm{fdi}}^{1-\sigma} MA_{\mathrm{fdi}} - v_{\mathrm{dom}}^{1-\sigma} MA_{\mathrm{dom}}} \tag{6}$$

where "fdi" designates the "best" foreign location the optimizing firm will choose if it invests abroad. From this, we get that the probability to invest abroad can be expressed as the probability that firm f productivity is higher than the productivity threshold. In logs, this condition becomes:

$$\begin{aligned} P_{\mathrm{fdi}}(f) \quad = \quad & \mathrm{prob}\left[(\sigma-1)\ln A(f) - \ln\sigma - \ln(F_{\mathrm{fdi}} - F_{\mathrm{dom}})\right. \\ & \left. + \ln(v_{\mathrm{fdi}}^{1-\sigma} MA_{\mathrm{fdi}} - v_{\mathrm{dom}}^{1-\sigma} MA_{\mathrm{dom}}) > 0\right] \end{aligned}$$

We approximate the gap $v_{\mathrm{fdi}}^{1-\sigma} MA_{\mathrm{fdi}} - v_{\mathrm{dom}}^{1-\sigma} MA_{\mathrm{dom}} = \exp(Y_{\mathrm{fdi}}(f)) - \exp(Y_{\mathrm{dom}}(f))$ by the estimated inclusive value incorporated in the upper model.[4] Apart from this, the variables included in $W_k(s)$ are thus the firm's global productivity and a measure of the extra fixed cost incurred when investing abroad:

$$W_k(f) = \delta_0 + \delta_1 \ln A(f) + \delta_2 \ln(F_k(f) - F_{k'}(f)) \tag{7}$$

To approximate this last variable, we use an argument found in the literature that explain why a firm chooses to invest in a foreign production unit rather than exporting from a domestic plant. As notably shown by Markusen and Venables (1998), the trade-off between export and FDI balances in favor of investment abroad when firm-specific fixed costs are high compared to plant-specific ones.[5] To

[4] Note that this is a natural approximation, since the inclusive value logic is to compare the *sum* of the bottom model utilities to the utility of investing domestically, while our theory suggests to use the *maximum* of the bottom model utilities as a comparison point.

[5] See Brainard (1997) and Ekholm (1998) for empirical evidence on US and Swedish data.

approximate those firm-specific fixed costs, we use the ratio of advertising expenditures on value-added. Note that this proxy could also capture another argument explaining the choice of investing abroad by the need to protect firm-specific assets under contractual incompleteness (see Horstmann and Markusen, 1987 for an early contribution). When the firm's value-added relies on intangible assets like its reputation or brand name, the firm may have an incentive to invest in a foreign plant rather than contracting with foreign parties that have few incentives to maintain its stock of goodwill. Both arguments however lead to the same testable intuition that intangible assets raise the perceived fixed cost of investing domestically (*i.e.* reduce $F_{\text{fdi}}(f) - F_{\text{dom}}(f)$) and increase the firm's propensity to invest abroad.

Last, if there are economies of scale when investing abroad, the firm's incentive to choose a foreign location should be correlated with the extent of its foreign network. Indeed, when fixed costs are firm- rather than plant-specific, the fixed cost of FDI is lower for a firm that already invested in that country. To implement this idea, we thus add the financial network variable in the upper model asking whether firms that have a developed network abroad are more likely to follow an FDI strategy. In the next section, we describe how these explanatory variables (as well as the dependent variable) are measured.

3 Data

3.1 The dependent variable: investments abroad and at home

Our dependent variable consists of investments by French firms in production affiliates located abroad or on the French territory. We use several firm-level datasets providing us with information on those two types of investment. We focus on manufacturing industries, both because the type of theory available to study FDI is better suited for manufacturing, and because the availability and quality of data on affiliates abroad is far better for manufacturing. There are essentially two types of information required: The characteristics of firms engaging in domestic or foreign investments and the location of the investments in the latter case.

Information on the characteristics of firms creating the new affiliates abroad or at home comes from a survey called EAE ("Enquête Annuelle d'Entreprise") available to us over the 1985-2002 period. This source is an annual survey of all French firms larger than 20 employees with information such as employment, value added, intermediate consumption, and wages. Critical to our work, this source also enables to detect creations of new establishments in France. The variable we use is the one that indicates the number of producing establishments of the firm. We count as a location choice in France, every increase in the number of producing establishments[6] by a firm over a fiscal year. Note that our procedure conditions the location choice in France on the fact that the firm already exists and has producing establishments before the location choice can be considered, i.e. we do *not* consider births of firms to be location choices in France, in order to have the most comparable set of choosers possible (large and firmly established firms). This procedure gives 19,309 establishment creations in France over the 1985-2002 period with 13,342 occurring during the last 10 years, which will be the focus of our econometrics. We also present results restricting the sample to firms belonging to financial groups that invest abroad at some point in our time frame, *i.e.* firms belonging to multinational companies (MNC). This drastically reduces the number of domestic investments to 2,244 over the 1992-2002 period.

The data used to identify location choices of foreign affiliates come from two sources. First we use an annual survey called "LiFi", conducted by the French statistical institute. It focuses on financial participation between firms. Firms above certain thresholds of portfolio participations (1.2 millions euros), shipments (60 millions euros) or employment (500 employees) are interviewed and asked their list of financial participations in different establishments in France and abroad. In 2002 for instance, the survey provides information on 193,895 manufacturing establishments. For each of those establishments, the following information is available: The "head" firm identification number (the final shareholder), the location (address plus a country code), the industry, the share held by the head in the affiliate, "the rank" of the affiliate, defined as the number of firms between the "head" and the affiliate and the year of investment. LiFi is available from 1986 to 2002.

[6] We drop the observations where the increase in the number of producing establishments is larger than 3 (from one year to the next), in order to minimize the number of mergers and acquisitions in our dataset (more than 75% of all creations we observe involve only one establishment, with an additional 20% involving two).

Table 1: Individual features of investing firms

	All investments	Foreign investments	Investments in France
Median Productivity	232	298	225
Median Employment	87	406	69
Median Advertising ratio	1.0106%	1.0151%	1.0100%
Total Number	16312	2970	13342

Note: Productivity measured by value added over the number of employees of the firm. Advertising ratio divides advertising expenditures by value added of the firm.

We complete this data using another source. The Direction of Foreign Economic Relationship in the French Ministry of Finance (DREE) provides independently-collected information on affiliates abroad of French firms (mostly based on surveys by French embassies abroad). For each of them, this source lists the country of residence, the industry, the year of investment, and other information such as employment and, sometimes, sales. Each of these foreign affiliates has been given an identifier and the French national statistical institute has identified a head in France. Some of these affiliates (and associated heads) are common to the two sources, but DREE brings some additional information. These two sources together provide information on 4081 manufacturing foreign affiliates linked to a French MNC since 1970. Out of those, 3036 are dated in the 1992-2002 period. We only kept foreign affiliates that still exist in 2002. They are located in 118 different countries. In the econometrics, we drop small islands from the dataset which brings our universe of possible location choices to 88 (including France). We also choose to restrict the sample to the post-transition period (1992-2002) because of the drastic changes in the incentives to invest in Eastern European countries following the fall of the Berlin wall.[7]

How different are foreign from domestic investments? Before turning to the econometric, rigorous, answer, it is instructive to use the hypothesis from the literature on our data. Firms investing abroad are expected to be more productive (and therefore larger in size) and to have a larger share of their costs characterized by multi-plants economies of scale (Research and Development or advertising expenditures are typical of such costs). Table 1 gives descriptive statistics along those lines for the whole sample of investments, as well as for each sub-sample of domestic and foreign investments. We observe that firms investing abroad are on average more productive and larger and that their advertising ratio is higher than for purely domestic firms (although only slightly so).

We now turn to a description of different explanatory variables used in the econometrics.

3.2 "Standard" covariates

Our covariates include the standard determinants of location choice that the theoretical and empirical literatures have found relevant. Most important is our measure of final demand: The market access (MA) of each country, which is estimated following Redding and Venables (2004). The estimation procedure is based on a gravity equation specified in accordance to the theoretical NEG framework. This estimation includes fixed effects for both importers and exporters in each cross section of the data. The Dixit-Stiglitz-Krugman model of trade predicts a bilateral trade equation where the fixed effect of the importing country is equal to $\ln(E_j P_j^{\sigma-1})$. Specifying trade impediments to be a function of distance, regional agreements, currency unions, GATT/WTO membership, colonial links and common language, one can reconstruct a "free-ness of trade" measure ϕ_{ij}, and in the end obtain $\text{MA}_i = \sum_j \phi_{ij} E_j P_j^{\sigma-1}$, for each potential location country (including France). Aggregate bilateral trade data come from the IMF's *DOTS* database, and CEPII provides all other gravity variables.[8] This market access variable (as most determinants having a time dimension) is calculated for the year of investment.

[7]Moreover, several explanatory variables used in the regressions are not observable before 1992. The availability of data is also of a problem for small islands, which explains why we dropt them from the analysis.

[8]The method used is detailed in Redding and Venables (2004), which limit their analysis to one year –1996–, and a more reduced set of countries and trade costs. Other than that, we use their preferred (third) specification

Three additional spatial variables measuring distance from France, common language and colonial linkages, are included to capture the extent of transaction costs involved by French investors in setting up a production affiliate abroad, TC_i in equation (5). It is likely that a short distance, a common language and past colonial links involve a higher knowledge of the country by the French business community. A natural reason for this would be that a large number of French or former French citizens are still located there for historical reasons, densifying social and business networks with France. Also, former colonies often kept parts of the French legal system, which reduces the information and legal costs needed to start and run a new firm in those countries. In addition, France imposed to the EU a large scheme of trade preferences for its former colonies, which makes those countries attractive compared to others when the goal is to re-export the product to France or other EU countries.

Another key proposed explanation for investing abroad relates to production costs. We proxy labour costs w_i by the level of GDP per capita, which we expect to enter negatively once demand MA_i is controlled for. The availability of high quality / low price intermediate inputs in the host country is controlled for by the supplier access SA_i variable described in greater detail below. Corporate taxes have also been shown to enter firms' investment decisions consistently (see de Mooij and Ederveen, 2003, for a survey). To check the robustness of our results to this motive (data for this determinant is not easily available for our entire sample), we add in one of our estimations the (log of the) host country's effective average tax rate, as computed by Devereux *et al.* (2002).

Finally, it has been repeatedly shown in all comparable empirical location choice papers, that one of the leading determinants of the location choice is the desire of investors to follow other foreign investors in the same industry. Head *et al.* (1995) were the first to empirically detect this behavior in a conditional logit model followed by many others since then. We follow the literature here and include the cumulated count of French affiliates in the same industry located in each potential host country in year $t-1$, where t is the year of choice. The interpretation of this type of variable can be quite broad. The first motivation given has been to capture agglomeration economies of the technological spillovers type. While this can be the source of the positive effect of this variable (almost invariably found), other channels of influence are possible. For instance, input-output linkages can be the source of such effects if the diagonal of the matrix is sufficiently thick, as is often the case. The supplier access presented later tries to control for this more precisely however. More generally, note that any variable omitted from the regression and that makes a country attractive to an industry can be captured by this industry count of firms.[9] Including this determinant is therefore important if only to temper any industry-specific omitted variable bias, although the interpretation of the variable is admittedly unclear. We view this variable more as a control here, while focusing the interest on more innovative determinants such as the influence of the firm's financial network, and the inclusion of the home country in the choice set.

Finally all regressions include continental dummy variables that are meant to account for a possible nested structure in the choice of a foreign location. Indeed, it is quite likely that countries inside the Asian continent for instance are more comparable than countries belonging to different continents, for instance because firms choose first to serve each continental zone through a production affiliate, and then choose a precise country inside that zone. More generally, those dummies account also for all unobserved fixed differences across large regions of the world during the period under study. We now describe in greater detail the more novel and complex variables.

3.3 Supply Access

In theoretical frameworks of the NEG type, a large number of local suppliers of inputs in a host country reduces the price index of intermediate inputs, and therefore production costs, which makes the country more attractive (Krugman and Venables, 1995, provide an early model of those interactions). Amiti and Javorcik (2006) were among the first to introduce a supplier access variable taking into account the actual

of trade costs, and the stata programme used to generate our MA, as well as the results are available upon request

[9] In particular, this variable probably accounts for the impact of other cost variables such as land prices or institutions, sometimes used in the literature but neglected in this paper because of data constraints. As our sample of investments abroad has a quite short time span but a much larger set of host countries than the usual, it is very hard to find consistent data for these specific cost variables. Moreover, the use of regional and even country fixed effects will control for most of those determinants since the variance of land prices or institutions for instance should be mostly cross-sectional over the time period considered.

matrix of inter-industry linkages in empirical location choice analysis.

Our measure of supply access is inspired from Amiti and Javorcik (2006) and relies on three assumptions. First, it assumes that an affiliate abroad uses intermediate inputs in the same proportion as firms of its industry in France. Second, we only account for the location of French affiliates producers of inputs, i.e. we restrict ourselves to the co-location of French firms that usually work together and neglect any belonging of these foreign affiliates to the same MNC.[10] This implicitly assume that French affiliates abroad are more likely to buy intermediate inputs from other French affiliates (or that the location patterns of French affiliates abroad is a good representation of the distribution of other firms one can source inputs from). The availability of inputs within a country k that are used by industry s in year t is defined as:

$$\mathrm{SA}_{s,t}^{k} = \frac{\beta_{s,t}}{D^{kk}} \left\{ \sum_{m=1}^{S} a_{t}^{sm} \psi_{m,t}^{k} \right\},$$

where $\beta_{s,t}$ is the share of all intermediate goods in the production of sector s and year t in France, and a_t^{sm} are the technical coefficients from French input-output tables for year t. The term $\psi_{m,t}^{k}$ stands for the share of the world output of industry m produced (by French affiliates) in country k in year t. As a proxy for output shares, we use employment shares: $\psi_{m,t}^{k} = \frac{l_{m,t}^{k}}{l_{m,t}^{W}}$, with $l_{m,t}^{k}$ being the overall employment of industry m in country k.[11] This measure is divided by the internal distance of country k, D^{kk}, in order to account for the ease of access to suppliers inside k. We lag supplier access by one year, in order to limit endogeneity and most of all not count ones' own investment in this variable. Supply access is a proxy for a low price index of intermediates in the considered country, and should therefore enter with a positive sign.

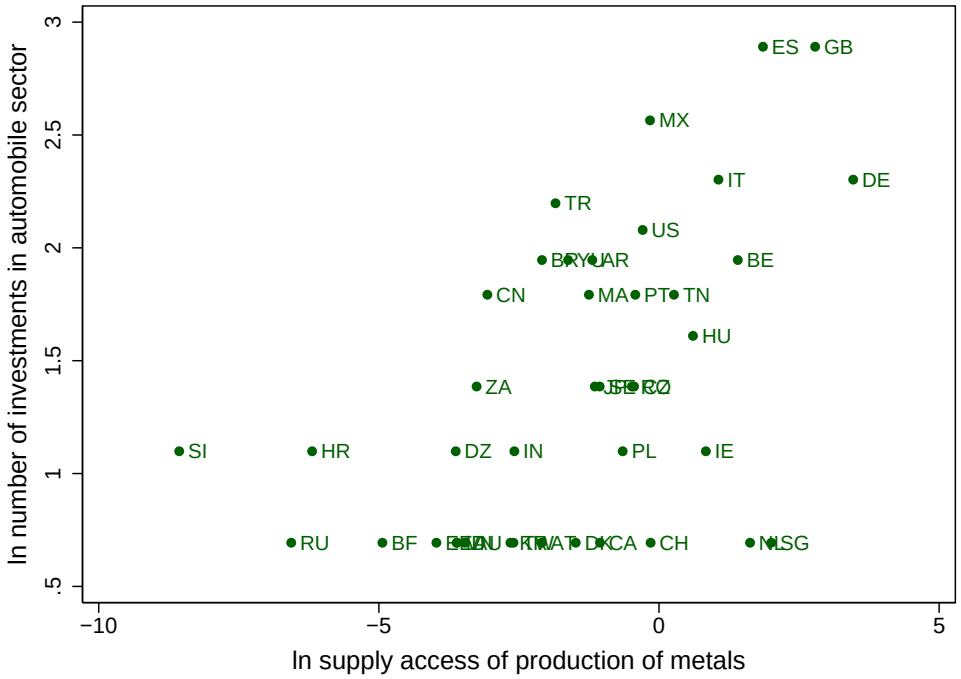

Figure 1: Supply access

Figure 1 provides an example of this variable for automobile sector. We plot the cumulated number

[10] Any financial linkages between foreign affiliates are taken into account by our "network" variable. For a recent theoretical discussion of sourcing from affiliates belonging to the same MNC, see Antras and Helpman (2004).

[11] In order to allow for some local trade in intermediate inputs by affiliates, we include in $l_{m,t}^{k}$ both French affiliates' employment in k and in its immediate neighboring countries.

of automobile investments in the different countries versus the supply access of one of the leading input in this industry: production of metal. The positive association between the two variables is quite clear.

3.4 Financial Network

The "financial network" variable is intended to take into account the web of affiliates that French large financial groups might have over the world. We use financial information available for affiliates known from LiFi (see above). It identifies all financial linkages between establishments and a "head" of group, but also describes the intensity of this linkage and therefore the depth of a group's presence in a country for a given year. It relies on two distinct variables : "share", which gives the percent ownership held by the group in the affiliate and "rank", which indicates the number of intermediates between the "head" and the affiliate. For each affiliate in a given country, we sum the ratio of "share" over "rank" for all affiliates belonging to the same group and located in the same country. This measure takes into account both the "length" and "strength" of the financial network of the group in each potential host country at a certain point in time.

$$\mathrm{NET}_t^k = \sum_{u<t} \left\{ \sum_{\omega \in g} \frac{\mathrm{share}_u^k(\omega)}{\mathrm{rank}_u^k(\omega)} \right\}$$

where g is the group whom the ω affiliate belongs to (ω indexing all members of the group). This variable is thus a cumulative sum (starting in $u = 1980$) of the financial linkages for a given affiliate until the year before the considered investment. As for the supply access variable, we add immediate neighboring countries to the sum. One interpretation of this variable is that it reduces transaction costs TC_i of operating in country i. It might also convey information about vertical linkages between French affiliates (ones that are not captured precisely enough by the industry level supply access variable). Those vertical integration networks have already been shown to yield agglomeration patterns in location choices by Japanese multinational firms (notably through estimates of vertical Keiretsus' influence, see Head *et al.* 1995 or Head and Mayer 2004).

3.5 Trends in the location of French-owned manufacturing establishments

We start by describing the overall patterns of French investments at home and abroad in recent years for our sample. Figures 2 and 3 represent the evolution of the spatial distribution of investments (counts of new affiliates) among foreign countries and between France and the rest of the world respectively. Two trends appear particularly clearly. Inside Europe, French FDI seems to relocate Eastward, with a substantial fall of the share of new affiliates located in Western Europe, and a substantial increase of Eastern European countries as destination countries. Note that Western Europe still hosts a dominant part of French FDI at the end of the sample, while Europe's share as a whole decreases slowly but remains slightly under 60% in 2002. The other important trend is the rise of Asia in general, and China in particular, as a receiver of French production affiliates. Figure 3 shows that although the share of investments located in the domestic economy is clearly decreasing, it remains remarkably high.[12]

Therefore, although there seems to be an increase in the share of low cost locations, rich countries (including the domestic economy) still host a very large part of French FDI. Note that the two types of locations do not need to be seen as substitutes, as was recently emphasized by Yeaple (2003). Indeed, complex strategies of investment abroad might involve establishing affiliates in low cost countries that increase the overall productivity of the firm and makes it more likely to pass the efficiency threshold necessary to be able to serve other rich markets through FDI. Figure 4 illustrates this type of complementarity. It plots, for each multinational firm in our sample, the number of affiliates located in rich countries (apart from France) against the number of affiliates located in poor countries.[13] The size of each point is proportional to the number of multinational firms that have those respective numbers of affiliates in 2002. While there is a very large number of MNCs that invest only once in a developed or in a developing country (and therefore seem to have pure horizontal or vertical strategies), there is a

[12] When restricting the sample to investments by firms that have at least one affiliate abroad, the qualitative evolution is very similar. The share of domestic investment peaks around 60% in 1992 to fall to 40% in 2002.

[13] We consider as "poor" countries those belonging to the low, midlow and midup classes of the income classification found in the World Development Indicators database.

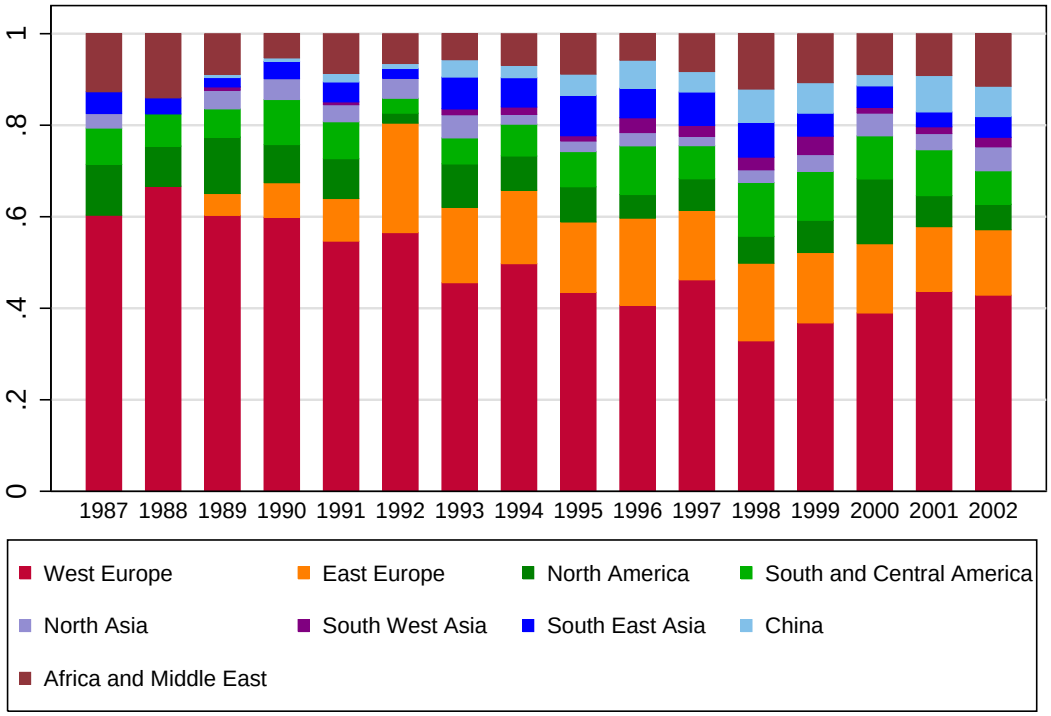

Figure 2: Distribution of French FDI by geographical zone

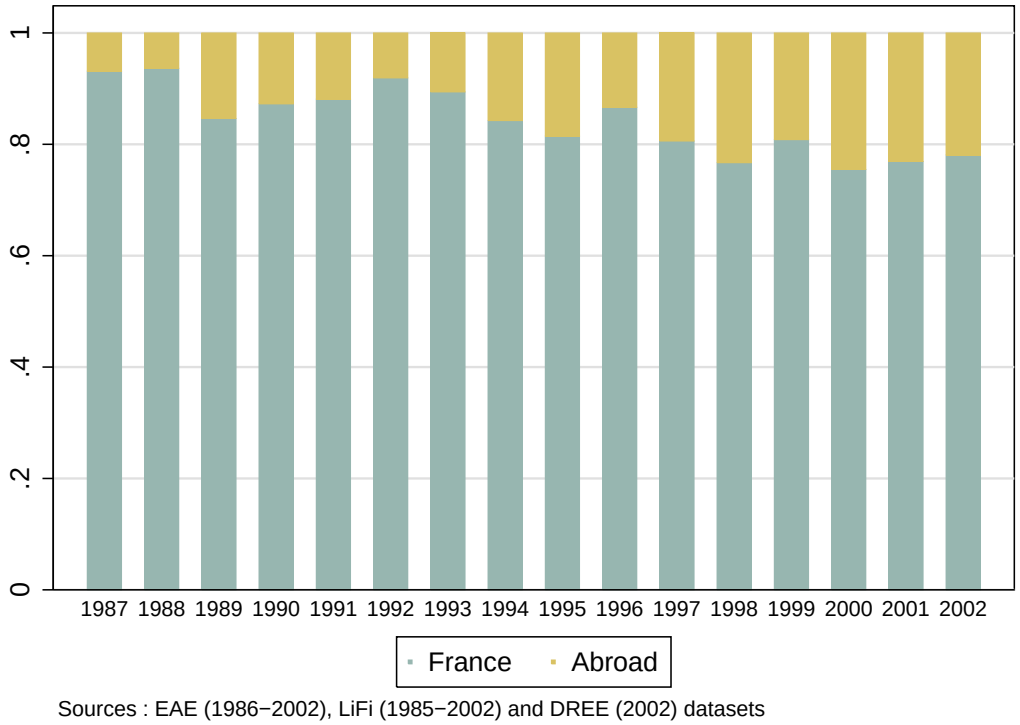

Figure 3: Investments by French firms: domestic / foreign

very substantial number of MNCs investing in both types of countries and that seem to follow complex strategies, where investments in poor countries are associated with more investments in developed ones.

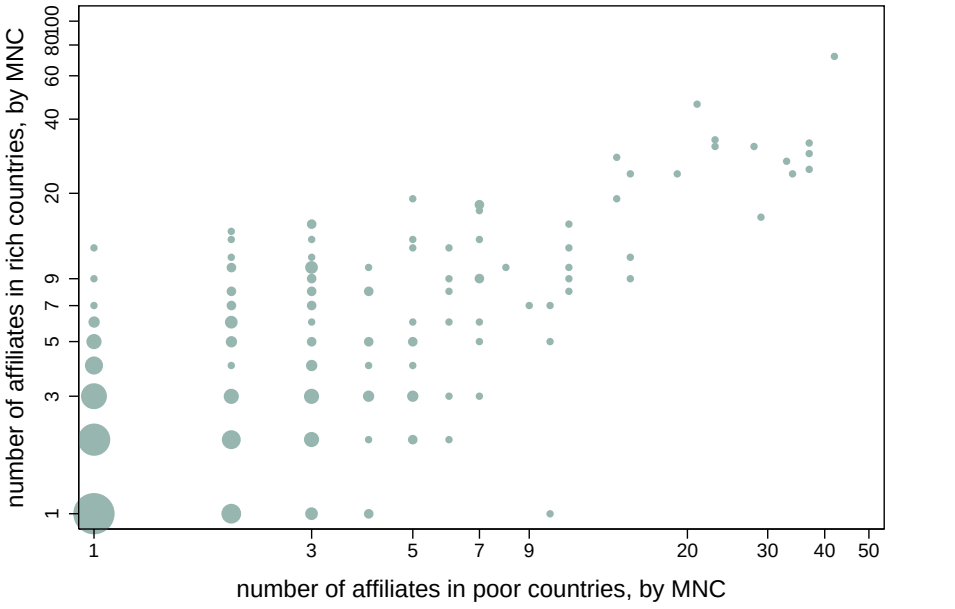

Figure 4: Vertical and horizontal complementarities in French FDI

We graph in Figure 5, the number of foreign investments and the average employment in those affiliates according to industries. Again a combination of sectors where market seeking motives or cost-saving motives are presumably dominant are intertwined as first industries of FDI in terms of counts of affiliates.

Finally, we provide a first graphical snapshot at some of the determinants we incorporate in the econometrics below. As stated above, the empirical literature on the topic has identified the size of the hosting market as one of the primary determinant in quantitative terms. Figure 6 graphs the cumulated number of investments between 1980 and 2002 against our measure of market access (MA, also often referred to as market potential) of the host country in 2002 (both in logs). It also identifies the countries that speak French officially, and the ones that are ex-French colonies. The estimated linear relationship gives a slope of .59 and a R^2 of .46. Other features of this global pattern are interesting. First, most of the ex-colonies and of the francophone countries are above the regression line, providing first support to the hypothesis on transaction costs of FDI being lowered by historical linkages. Second, France is a very large positive outlier in this graph. Both types of observations could be linked to a common factor, that is the proximity of ex colonies, francophone countries and of course the domestic economy for French investors. Figure 7 experiments with this idea, passes the right-hand side of the previous regression on the left-hand side, and plots the resulting figures on the log of distance. A clear negative relationship emerges, but ex-colonies, French-speaking countries, and most of all France remain clear positive outliers on average.

One of the main interest of what follows will be to try and quantify more precisely the size of this "home bias" in investment patterns, its evolution and its explanations. Reasons for the size and relative decline in the share of domestic investment can be roughly classified in two parts. The first is quite simple: France is a large, rich, and familiar country to most French investors, and there might be no bias per se involved in its share, *once all location choice determinants are properly controlled for*. The same is true for the evolution of this share. In the time period covered by our sample, France has experienced a relatively low rate of growth compared to other developed or emerging economies. That and other evolutions of determinants might be enough to explain the fall in the share of investments located in the

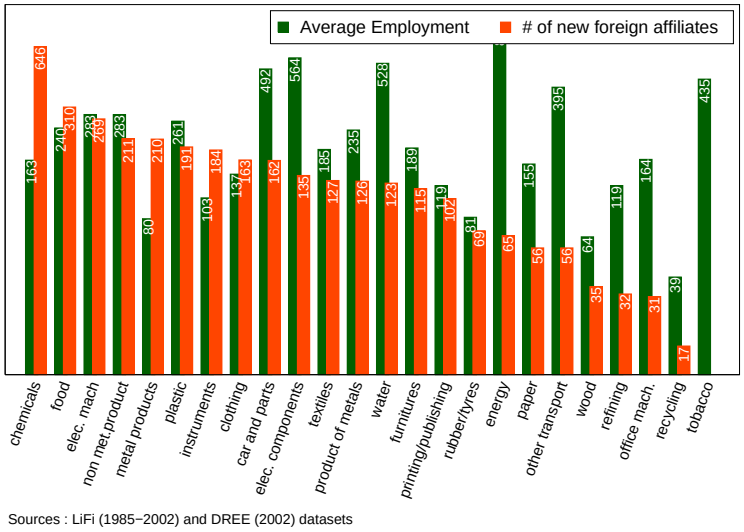

Figure 5: Distribution of investments by industry

domestic economy. The other possible interpretation is that there is a genuine bias, emerging from an unobserved average preference of investors for their home country, or average difficulties to invest abroad (for instance because of the lack of knowledge and expertise on how to do business in a country other than France). Those biased preferences or barriers to FDI might be fading away with a gradual increase in the proportion of non-French shareholders in France-based multinational firms for instance. Those two channels have quite different policy implications, and we try below to quantify them.

4 Results on foreign affiliates

We start with the conditional logit estimation, focused on the choice of country for location of French affiliates abroad. There are 87 possible host countries for more than 2500 location choices over the 1992-2002 period.

Table 2 provides results for five different specifications. Column (1) present benchmark results on standard determinants. Market access enters with the expected sign and its magnitude matches usual findings in the literature. With variables taken in logs (and a large number of location choices), the coefficient on each variable is very close to elasticities of the probability of choosing a country for the average investor (see Train, 2003). A 10% increase in market access therefore increases the probability of attracting French investors by about 5%. The three transaction costs variables (distance, language and colonial links) enter in the expected way, as do our proxy for labour costs (GDP/cap) which is significantly negative. The coefficient on the counts of firms in the same industry is as usual very robust, positive and extremely significant, also within the same order of magnitude as other findings in the literature.

Column (2) introduces the supply access variable, while column (3) introduces the financial networks. Supply access always has a significant and positive effect, which is consistent with results by Amiti and Javorcik (2006): Affiliates tend to be located where it is easier to find suppliers. Note also that the inclusion of this variable tends to reduce the influence of some covariates. Distance to France in particular sees its influence diminish in absolute value, suggesting that at least some of the effect of this variable comes from its power to proxy supply access determinants. The same is true for the financial network variable, although to a lesser extent. Those networks have a very powerful influence on location choice, that seem to leave unaffected the supply access motive.

Note that introducing supply access and financial networks simultaneously affects the point estimates of the count of firms in the same industry in an expected way (comparing columns 1 and 3). The count of firms variable has an ambiguous effect in theory. While the variable might capture positive technological spillovers, input-output linkages or unobserved attractive features of countries, a high number of firms

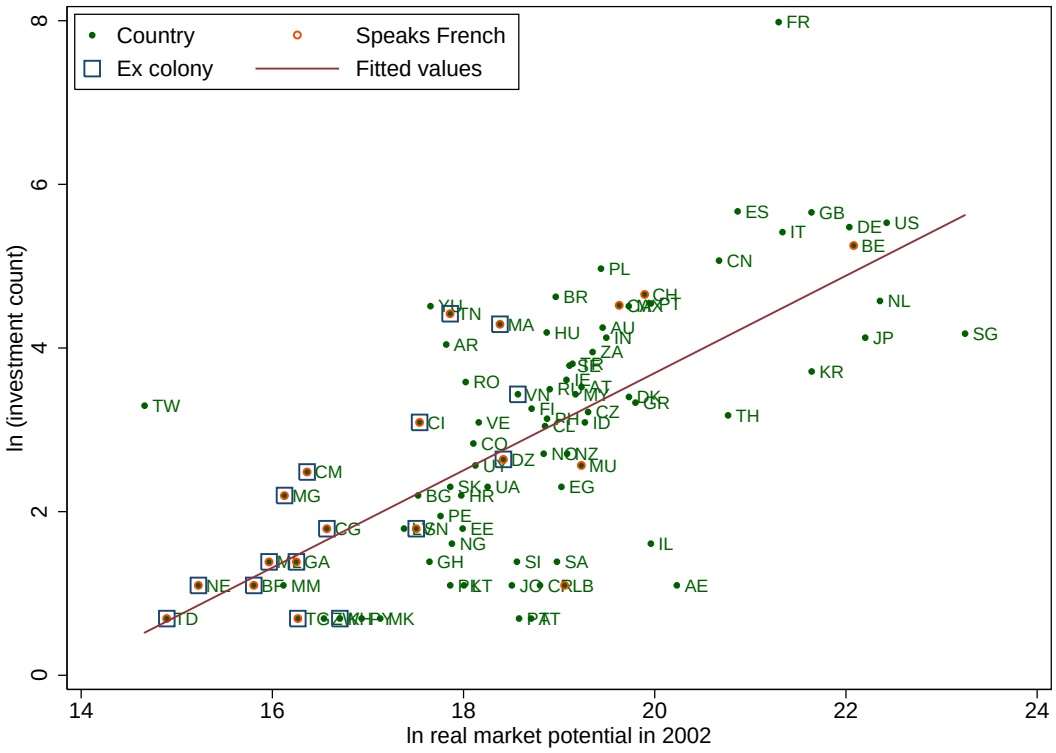

Figure 6: French investments and market size

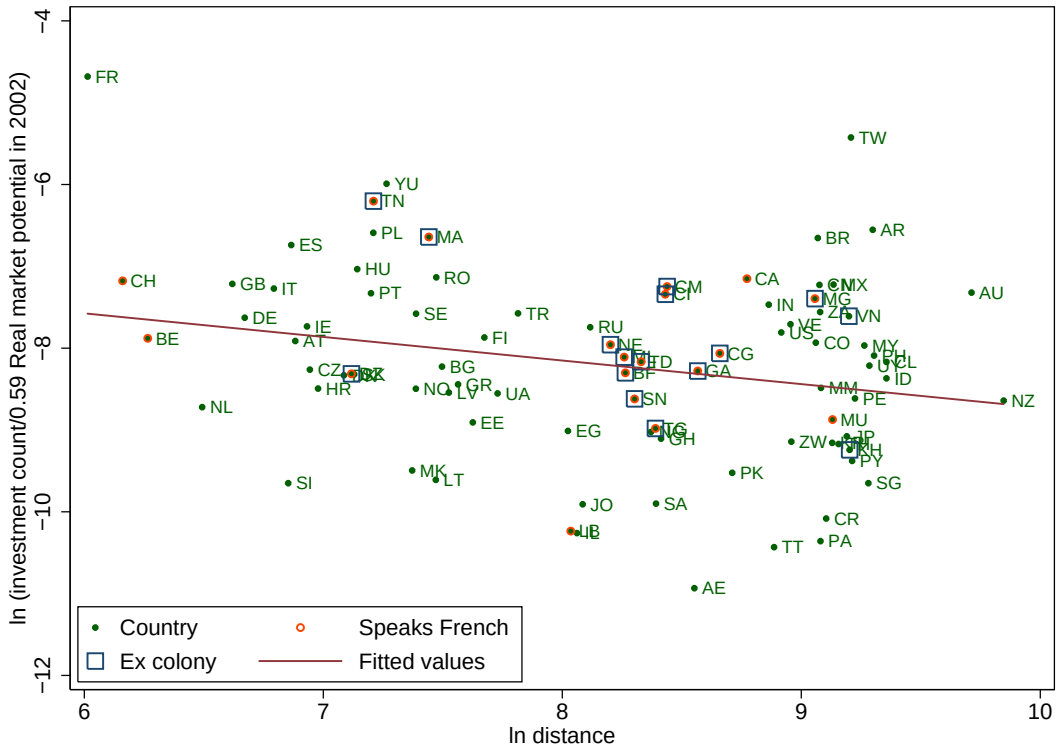

Figure 7: French investments and distance

from the same industry also means a high level of local competition for both sales and inputs, which reduces attractiveness. Once controlling for supply access and financial networks, the negative competition effect should be more powerful, and the coefficient driven towards zero as a consequence. We observe such effect, although moderated.

Comparing the impact of variables should go beyond comparing elasticities (very closely approximated by coefficients here), since our different variables have different variance. For instance, in the sample of column (3), the coefficient of variation (standard deviation over mean) are 0.253 for market access, 2.998 for counts of firms, 4.863 for supply access, and 0.543 for financial networks. Head and Mayer (2004) propose the following thought experiment: Take an hypothetical country with mean value of a variable of interest (market access say) and redistribute market access over countries such that the considered country experiences a one standard deviation positive shock in MA (but the overall inclusive value is unchanged). The ratio of new over baseline probabilities of being chosen is $[1 + \text{cv(MA)}]^{\beta_{\text{MA}}}$, with β_{MA} being the estimated coefficient, and cv(MA) the coefficient of variation of the variable in question. Carrying this one standard deviation shock exercice gives an increase in probability of being chosen of 10% for market access, 19% for supply access, 111% for counts of firms, and 48% for financial networks.

Table 2: Conditional logit for investments abroad

	Dependent Variable: Chosen Country				
Model :	(1)	(2)	(3)	(4)	(5)
ln market access	0.49^a	0.44^a	0.43^a	0.26^a	-0.01
	(0.03)	(0.03)	(0.03)	(0.06)	(0.11)
ln distance	-0.45^a	-0.32^a	-0.29^a	-0.52^b	
	(0.07)	(0.08)	(0.08)	(0.22)	
common language	-0.01	-0.23^a	-0.21^b	-0.65^a	
	(0.08)	(0.08)	(0.08)	(0.14)	
ex colony	0.35^a	0.40^a	0.39^a		
	(0.12)	(0.12)	(0.12)		
ln GDP per capita	-0.34^a	-0.33^a	-0.32^a	-0.49^a	0.07
	(0.03)	(0.03)	(0.03)	(0.12)	(0.17)
ln (# of same ind. firms -1)	0.60^a	0.56^a	0.54^a	0.25^a	0.20^a
	(0.04)	(0.04)	(0.04)	(0.06)	(0.04)
ln (supply access -1)		0.10^a	0.10^a	0.16^a	0.16^a
		(0.01)	(0.01)	(0.02)	(0.03)
ln (financial network -1)			0.91^a	1.07^a	0.94^a
			(0.09)	(0.15)	(0.09)
ln (1+effective average tax rate)				-1.60^c	
				(0.95)	
Region fixed effects	yes	yes	yes	yes	no
Country fixed effects	no	no	no	no	yes
Investments × countries	207331	207331	207331	22882	207331
Investments	2639	2639	2639	1346	2639
Pseudo R^2	0.110	0.113	0.117	0.093	0.162

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

We check for the robustness of these results with two additional specifications. Column (4) adds a control variable measuring the host country's effective average tax rate, as fiscal competition has often been shown to affect FDI flows (see Devereux and Griffith, 1998). To this aim, we use Devereux *et al.*

(2002) data that cover 18 OECD countries.[14] As expected, the coefficient associated with this variable is negative and (slightly) significant. Controlling for fiscal competition however strongly reduces the estimation sample which pushes downwards the point estimates of the market access and the count of firms variables.[15]

Last, column (5) of Table 2 introduces country fixed effects in the estimation. This accounts for every characteristic of location countries (some observable, some not) that do not vary over our time frame, 1992-2002. Distance to France, common language and ex-colony variables are naturally dropped in that specification, which identifies coefficients in the time dimension only. The biggest change is the fall of market access and GDP per capita coefficients into insignificance. In the short time period we use, the variance in both variables is clearly dominated by the cross-sectional differences rather than by evolution over time. It is therefore not extremely surprising that those variables loose impact when country fixed effects are introduced. On the contrary, the three last variables have very important variation over time in different countries. They retain very strong statistical significance, and the coefficients are little changed, with the exception of the count of firms. Again, this is not inconsistent with the "residual attractivity" interpretation of this variable, which can represent all omitted characteristics that make a country a desirable place to invest for most investors. If most of those unobservables are fixed factors, the coefficient will be dampened accordingly after fixed effects are introduced.

5 Results on foreign and domestic investments

We now introduce in the location choice the possibility for firms to invest in their own country, France. So doing, we try to answer the following question: How different is the domestic economy in location choice of manufacturing affiliates? We first replicate the above conditional logit estimation on the full set of investments with a dummy indicating domestic ones. In a second step, we allow for specific substitution patterns among domestic and foreign locations using the nested logit model.

5.1 Conditional logit

Results of the conditional logit estimation on the whole set of location choices are presented in Table 3.[16] In comparison with Table 2, adding investments in France increases the pseudo-R^2 in an impressive way. This means that our logit specification is especially well designed to explained domestic investments. Column (1) contains our baseline estimates. All coefficients are left almost unchanged, except for the count of firms, that increases slightly. However, this is not sufficient to account for the very large number of investments in France compared to investments in other countries. The coefficient on domestic investments in Column (1) reveal that the odds ratio of investing in France rather than in a country of comparable market access, distance, GDP per capita and same count of firms in the industry is slightly over ten. Turning to column (2) we see that part of this "excessive" domestic investment can be accounted for by supply access, but column (3) shows that most of it comes from the higher domestic financial networks. The ratio of probabilities of investing in France rather than in a comparable country in terms of financial network is reduced to a factor of $\exp(1.27) \simeq 3.5$, and only 2.9 if the foreign country is a former colony ($\exp(1.27 - 0.20)$).

We therefore have a first answer to our question concerning the specificity of domestic over foreign investment. While the initial difference in the number of investments might yield to an interpretation in terms of massive "home bias" by investors, a large part of it can be accounted by standard determinants of location choices. In particular, the much higher financial linkages of investors in their domestic economy explain a very large proportion of the difference, leaving little difference to be explained by a specific preference for the domestic economy.

[14] The reduced spatial coverage explains why the number of observations strongly decreases between columns (3) and (4) and why the "ex colony" variable disappears from this specification.

[15] Note that this drop in the magnitude of coefficients is not attributable to a bias of omitted variable affecting estimations that neglect the fiscality. Indeed, when running the specification without the tax rate variable on the reduced sample, the estimated coefficients are reduced as well.

[16] Note that we chose to set the colonial and language dummies to 0 for France in this table, which is of course just a matter of rescaling coefficients. We find the interpretation more natural this way.

Table 3: Conditional logit global for investments abroad and in France

	Dependent Variable: Chosen Country						
Model :	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln market access	0.41^a	0.35^a	0.34^a	0.34^a	0.35^a	0.33^a	0.34^a
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
ln distance	-0.44^a	-0.28^a	-0.26^a	-0.27^a	-0.26^a	-0.22^b	-0.26^a
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
common language	0.03	-0.21^b	-0.18^c	-0.19^b	-0.17^c	-0.14	-0.18^c
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
ex colony	0.19	0.23	0.20	0.20	0.21	0.19	0.20
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
ln GDP per capita	-0.26^a	-0.25^a	-0.25^a	-0.24^a	-0.25^a	-0.24^a	-0.25^a
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
France	2.59^a	2.46^a	1.27^a	3.97^a	4.50^a	6.07^a	1.32^a
	(0.08)	(0.09)	(0.10)	(0.29)	(0.17)	(0.41)	(0.10)
ln (# of same ind. firms -1)	0.89^a	0.88^a	0.86^a	0.87^a	0.82^a	0.83^a	0.87^a
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
ln (supply access -1)		0.11^a	0.10^a	0.10^a	0.10^a	0.10^a	0.10^a
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
ln (financial network -1)			0.79^a	0.79^a	0.82^a	1.74^a	0.79^a
			(0.03)	(0.03)	(0.03)	(0.08)	(0.03)
France × ln productivity				-0.49^a			
				(0.05)			
France × ln employment					-0.58^a		
					(0.03)		
France × ln financial network						-0.98^a	
						(0.08)	
France × ln advertising							-1.49^a
							(0.29)
Region fixed effects	yes	yes	yes	yes	yes	yes	yes
Investments × countries	1131094	1131094	1131094	1131094	1131094	1131094	1131094
Investments	14294	14294	14294	14294	14294	14294	14294
French Investments	12238	12238	12238	12238	12238	12238	12238
Pseudo R^2	0.819	0.819	0.829	0.830	0.834	0.830	0.829

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

We then ask for the stability of the "French exception" by running the regression of column (3) in Table 3 over three-years windows. Results can be summarized graphically by looking at this "French exception" coefficient over time. Figure 8 presents point estimates for each middle year of the windows with 5% confidence intervals. What we observe in this graph is a relative stability of the coefficient over the time period used in the regression (1992-2002). This graph suggests that the fall of the share of manufactured investments located in France over this period can be mostly accounted for by the other determinants identified in the regressions. Note that while the French exception coefficient is quite stable, not all of them are. An interesting one relates to colonial links, as illustrated in Figure 9. Here, ex-colonies pass from a largely favored status to a relatively neutral one over the decade (apart from their growth performance and other determinants which are controlled for in the regression).

Our results thus suggest that a large share of the "French exception" can be explained by the determinants of location choices, among which the financial network seems to be of particular interest. Still however, the "France" dummy remains significant even when controlling for the supply access and financial network determinants. According to Helpman *et al.* (2004), this home bias can be explained by the heterogeneity of firms in terms of their productivity: If there is an additional fixed cost for investing abroad, only the most productive firms can do FDI. This explanation of the "Export vs. FDI" arbitrage thus suggests that the number of domestic investments should be linked to the distribution of productivity among firms. So as to investigate this, we interact the "France" dummy variable with the productivity measured at the firm-level (apparent labor productivity, measured as average value added per worker in the firm). Results are given in column (4) of Table 3. As expected, the interaction between the "France" dummy and the individual productivity is negative and significant, which means that the home bias of

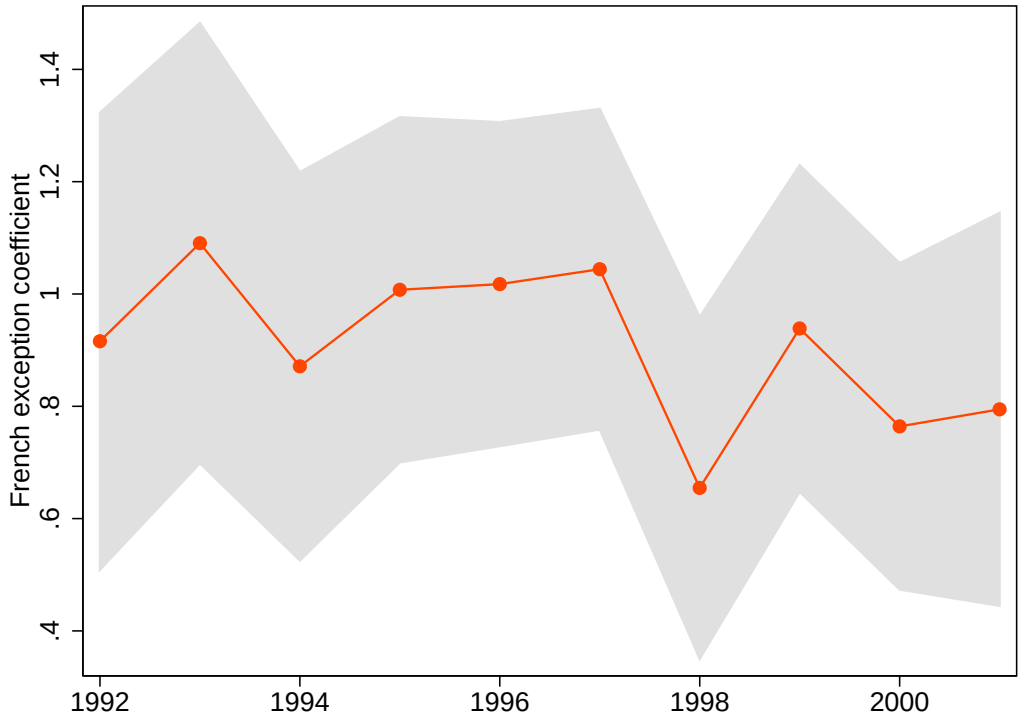

Figure 8: Coefficient on domestic investment over time

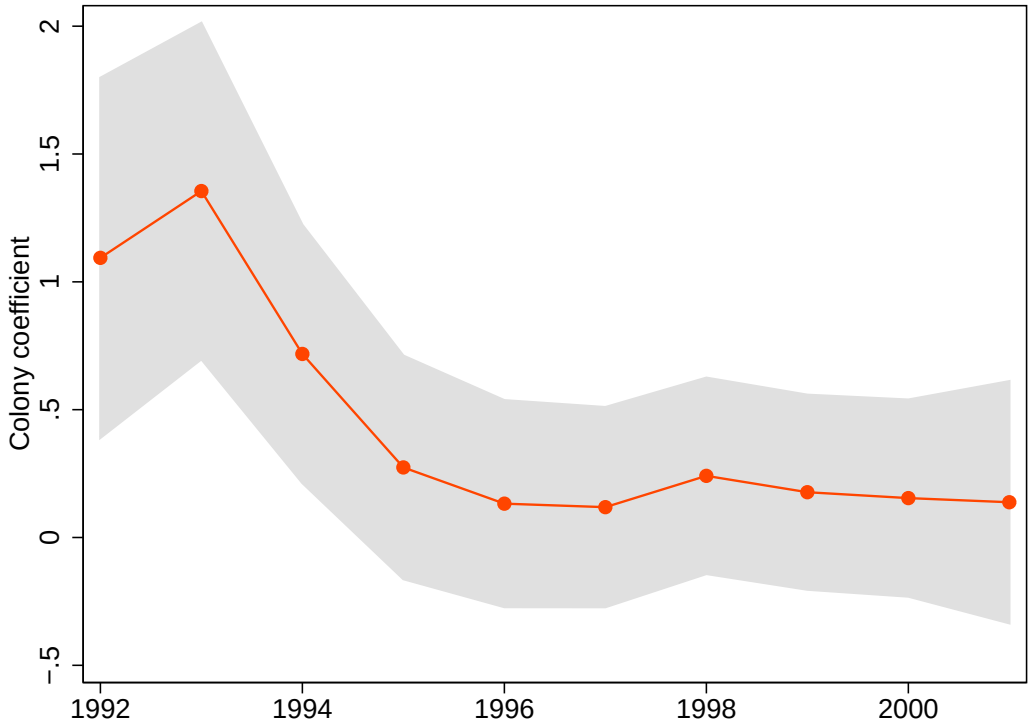

Figure 9: Coefficient on investment in ex-colonies over time

French investors is much less pronounced when the firm is more productive. A drawback of this approach is that the magnitude of coefficients in the conditional logit model with interacted terms can no more be interpreted as elasticities (Ai and Norton, 2003). To get an idea of the size of the productivity effect, we thus run a simulation exercise. Using the estimated coefficients of column (4), we first compute the median probability of investing abroad in the sample of 14294 firms, which is 2.8%. Then, we simulate a one standard deviation positive shock in productivity affecting the whole distribution of firms. The probability of investing abroad increases to 5.1% as a consequence. As a robustness check of this finding, column (5) interacts the "France" dummy with the firm's employment, used as proxy of its size. Again, the interaction between the "France" dummy and the individual variable is significantly negative and sizeable. Indeed, a one standard deviation shock in employment increases the probability of investing abroad from 1.9 to 12.9%.

In column (6), we then interact the "France" dummy with the financial network measure to ask if, beyond its impact on the variable cost, this variable is also correlated with the fixed cost of investing abroad in which case firms will be more likely to locate their affiliate abroad when their financial linkages around the world are more developed. Here also, the obtained coefficient is negative and strongly significant. Simulations suggest that a one standard deviation shock in this variable increases the probability for a firm to invest abroad from 3.2 to 4.8%. Last, column (7) reports results from an estimation interacting the "France" dummy with the ratio of advertising expenditures on value added to ask for the impact of "intangible assets" on the choice of investing abroad. The obtained coefficient is significantly negative and simulations suggest that a one standard deviation increase in advertising expenditures raises the probability to settle an affiliate abroad from 3.0 to 5.2%.

Table 4: Conditional logit global for investments abroad and in France by MNCs

	Dependent Variable: Chosen Country						
Model :	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln market potential	0.44^a	0.39^a	0.38^a	0.38^a	0.38^a	0.37^a	0.38^a
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
ln distance	-0.43^a	-0.31^a	-0.28^a	-0.28^a	-0.28^a	-0.25^a	-0.28^a
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
common language	0.02	-0.18^c	-0.15	-0.15^c	-0.15	-0.13	-0.15
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
ex colony	0.20	0.24^c	0.22	0.22	0.22	0.21	0.21
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
ln GDP per capita	-0.30^a	-0.29^a	-0.28^a	-0.27^a	-0.28^a	-0.27^a	-0.28^a
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
France	1.39^a	1.29^a	0.64^a	2.04^a	1.93^a	3.28^a	0.68^a
	(0.09)	(0.10)	(0.11)	(0.33)	(0.20)	(0.41)	(0.11)
ln (# of same ind. firms -1)	0.71^a	0.70^a	0.74^a	0.74^a	0.72^a	0.72^a	0.74^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
ln (supply access -1)		0.09^a	0.09^a	0.09^a	0.09^a	0.08^a	0.09^a
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
ln (financial network -1)			0.58^a	0.59^a	0.64^a	1.07^a	0.57^a
			(0.04)	(0.04)	(0.04)	(0.08)	(0.04)
France × ln productivity				-0.25^a			
				(0.06)			
France × ln employment					-0.22^a		
					(0.03)		
France × ln financial network						-0.53^a	
						(0.08)	
France × ln marketing							-0.91^b
							(0.38)
Region fixed effects	yes	yes	yes	yes	yes	yes	yes
Investments × countries	324693	324693	324693	324693	324693	324693	324693
Investments	4086	4086	4086	4086	4086	4086	4086
French Investments	2030	2030	2030	2030	2030	2030	2030
Pseudo R^2	0.454	0.455	0.462	0.462	0.463	0.463	0.462

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

Results in the last four columns of table 3 thus suggest that firm-specific features influence the probability that French investors locate their affiliate abroad. This results will be studied in a more structural way in section 5.2 using the nested logit model. Before this however, estimations of table 3 are run on a restricted sample of multi-national firms that do invest abroad at some point in our sample. This selection drops investments in France by firms that are purely domestic. Another interpretation is that we now concentrate on those investors that are productive enough to have been able to locate at least one affiliate abroad at some point in the last 20 years. Those investors also sometimes choose to locate new affiliates in France, in fact roughly half the time so in our sample which is now much more balanced. Results are summarized in Table 4. With respect to estimations based on the whole sample (Table 3), the main difference lies in the France coefficient. It starts two times lower in magnitude than in the full sample (see the comparison of column (1) in Tables 3 and 4), and is reduced to a small figure in column (3), when supply access and financial network are included in the regression. In the same way, coefficients obtained with the interacted variables in columns (4)-(7) are smaller (in absolute value). These estimations thus suggest that the "French exception" is less pronounced among large multinational companies.

In short, location choice determinants, notably our new financial network variable, are able to explain almost entirely the difference between investments abroad and at home in this reduced sample where only large internationalized (*i.e.* more productive) groups are studied. This last result confirms the role of firm-specific determinants in explaining the choice between investing in France or doing FDI. This decision is studied in a more structural way in the next section using the nested model.

5.2 Nested logit

In this section, we investigate the trade-off between location at home or abroad using a nested decision tree to model the investors' choices. This method allows to integrate in the model potentially richer substitution patterns that the conditional logit estimates. In the nested logit estimation, we explicitly account for the specificity of France as a potential location of investment. The simplest estimation procedure solves the problem backwards. We first estimate the "bottom" model explaining the choice of a given foreign country among the whole set of alternatives (87 foreign countries). We use for this the same explanatory variables as above. With the obtained coefficients, the inclusive value is then calculated as the sum of utilities of all choices inside each nest (foreign countries and France). This inclusive value sums up the expected profits that can be expected by the chooser based on the characteristics of all underlying host countries. It is then included in the conditional logit explaining the decision to invest at home or abroad (the "upper" model). In addition to this inclusive value, we add other covariates that take into account the role of firms' heterogeneity in explaining the decision to invest abroad.

Results are summarized in Table 5. For all columns, the "bottom" estimation (column (1)) remains unchanged. It explains the choice of a foreign location by the destination country's market access, its GDP per capita, supply access, as well as the gravity variables, the financial network and the count of past investments in this country. Results are the same as in Table 2. As for the "upper" model, column (2) gives results obtained when only the inclusive value is introduced to explain the foreign versus domestic investment decision. The estimated coefficient is strongly significant and near unity, meaning that the correlation between the unobserved components of utility for alternatives within each nest is weak in comparison with the correlation of errors between nests. As mentioned earlier, with an inclusive value coefficient of one, the nested logit model collapses to the conditional logit model. Hence, our results suggests that the substitution patterns among locations are not crucially different whether or not one of the considered country of operation is the domestic economy. This seems to go in the same direction than our results from the former section: Once the determinants of location choice are taken into account, conditional logit estimates reveal that the level of the very large home bias observed initially is drastically reduced. The unitary value of the inclusive value coefficient adds that the national economy is not that different from the rest of the world in terms of substitution patterns.

In columns (3)-(7), we add a "France" dummy as well as several firm-specific features interacted with this dummy. As already suggested in conditional logit estimations, the propensity to invest in France decreases with firm's productivity (column (4)) and size (column (5)), as expected from Helpman *et al.* (2004). Replicating the simulation exercice of section 5.1, a one standard deviation productivity shock affecting the whole distribution of firms increases the probability of investing abroad from 3.0 to 5.7%. On the other hand, an equivalent shock on the size of investing firms raises this probability from 2.0 to

Table 5: Nest Logit France/Row Choice

	Dependent Variable: Chosen Country						
Model :	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln market potential	0.42^a						
	(0.03)						
ln distance	-0.29^a						
	(0.09)						
common language	-0.15						
	(0.09)						
ex colony	0.25^c						
	(0.14)						
ln GDP per capita	-0.31^a						
	(0.04)						
ln (# of same ind. firms -1)	0.49^a						
	(0.04)						
ln (financial network -1)	0.92^a						
	(0.09)						
ln (supply access -1)	0.08^a						
	(0.02)						
	Dependent Variable: Chosen Nest						
inclusive value		0.94^a	1.33^a	1.33^a	1.33^a	1.89^a	1.33^a
		(0.02)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
France			2.31^a	4.98^a	5.97^a	8.31^a	2.36^a
			(0.04)	(0.27)	(0.16)	(0.24)	(0.05)
France × ln firm's productivity				-0.48^a			
				(0.05)			
France × ln firm's employment					-0.67^a		
					(0.03)		
France × ln financial network						-0.97^a	
						(0.04)	
France × ln advertising							-1.18^a
							(0.31)
N	161791	28658	28658	28658	28658	28658	28658
Pseudo R^2	0.121	0.401	0.687	0.693	0.728	0.727	0.688

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

16.3%. The "Export vs. FDI" decision seems also to be influenced by the firm's financial network and the size of its intangible assets (columns (5) and (6)). A one standard deviation increase in the financial network raises the probability to invest in a foreign country from 3.4 to 16.4%[17] whereas an equivalent shock on the distribution of advertisement expenditure ratios increases it from 3.2 to 5.1%.

6 Conclusion

Using a unique dataset of individual investment decisions, this paper analyzes the determinants of French firms' choices about where to locate their affiliates. The main originality of this work is that it allows to account for both investments at home and abroad. We are thus able to assess whether the determinants of a domestic investment are the same as the ones for foreign investment. The dataset also contains details concerning the financial links between firms and their affiliates worldwide. This allows to measure the role of the firm's financial network in future investment decisions.

We first concentrate on location decisions abroad. Our conditional logit estimation confirms several results of the empirical literature. Namely, we find that location decisions are positively influenced by host country's market access and supply access, while they are negatively linked to our proxies for labour and transaction/coordination costs. Moreover, we find that the probability to invest in a given country

[17]This result only takes into account the impact of the network variable on the upper model, thus neglecting the effect of the shock on the inclusive value.

increases when the firm's financial network in this country is more developed.

In a second step, we incorporate France as a possible location in the choice set, and ask whether the domestic economy can be considered as a potential location site like any other country. Conditional logit estimates suggest on the contrary that there is a strong "French exception" leading to a much higher probability to invest in France than abroad for French firms. A large part of this "home bias" in investment decisions can however be accounted for by a better supply access and a higher density of financial networks in France. The residual premium on the domestic economy is then investigated further using the nested logit model that allows for different substitution patterns between France and the rest of the world. This third step shows that firms investing abroad are, on average, more productive and larger, which confirms results by Helpman *et al.* (2004). The "knowledge capital" model is also supported by the data since firms with more intangible assets are more likely to invest abroad than domestically. These results suggest that firms investing abroad pay an additional fixed cost that increases the threshold of operating profit that a firm must achieve to consider FDI to be profitable. This explains why only the most productive, larger firms invest abroad. However, FDI can also be seen as a way to keep control over the relationship with customers, notably for firms with more intangible assets.

7 References

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