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DT/2018-03

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# Interaction between firm-level and host-country characteristics and multinationals' integration choices

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December 13, 2017

## Abstract

This paper extends the traditional international make or buy dilemma with a twofold contribution. First it considers joint-ventures, breaking with the common dichotomy. Second, it introduces a second source of heterogeneity among multinational firms, besides productivity: internationalization experience, which provides the firms complementary assets than does the total factor productivity (TFP). While both TFP and experience foster international integration, TFP is found to be more determinant in countries with strong contractual institutions and (only) experience matters in less certain destinations. The predictions from our reduced-form model are supported by the empirical examination of 6,321 French foreign affiliates in 87 countries.

*Keywords:* FDI, joint-venture, foreign ownership, Firm heterogeneity, total factor productivity, Gradual Internationalization.

*JEL codes:* F23, F21, D24, L24

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# 1 Introduction

Why should economists study the rationale for international Joint-Ventures (JVs) when the management literature already covers this issue? Recent developments in economics give some support to the economic examinations of international JVs. Not only the 2016 “Nobel prize” in economics went to Oliver Hart and Bengt Holmström for their contribution to the understanding of contracts in economics, and notably in team production and joint ventures. But moreover, the choice of the organizational structure go beyond the firms’ individual performance that motivates management researchers, and has true economic externalities effects, such as local spillovers implications<sup>1</sup>.

Yet, we certainly have a great deal to learn from international business literature since it has been the first one to open the black box that are the firms in the mainstream economic approach, and coined the “entry mode choice” expression, which broadly corresponds to the international integration dilemma of the Grossman-Hart-Moore framework, but includes JVs.

Although this literature recently started to spread into more traditional economics analyses, as reports Hayakawa, Machikita, and Kimura (2012)<sup>2</sup>, we mostly stand with two closely related literatures concerning their topic, but that diverge on their hypothesis, their analytic tools, and even their findings.

Traditional heterogeneous firms models *à la* Antràs and Helpman (2004) focusing on FDI and foreign ownership share only consider productivity-related firm heterogeneity, as if the total factor productivity (TFP) embodies all firm heterogeneity. This TFP differences would explain the FDI versus trade dilemma by shifting the trade-off between fixed and variable costs. To the contrary, international management literature ignores TFP, but mainly insists on learning-by-doing process and gradual internationalization (Johanson and Vahlne, 2009), and the role of cultural distance (Shenkar, 2001). The gradual pattern of internationalization starts to emerge in international economics literature with recent models of gradual strategies at early stages of firm internationalization. However they do not jointly consider heterogeneity in TFP and experience<sup>3</sup>.

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<sup>1</sup>See Iršová and Havránek (2011, 2013) for surveys on spillover differences between joint ventures and wholly owned subsidiaries.

<sup>2</sup>A working paper version of this review even considers the entry mode analysis as the third of the “eight literature lines” of firm level analysis of globalization (Hayakawa, Kimura, and Machikita, 2010, section 2.3)

<sup>3</sup>For progressive engagement in exports see Albornoz, Calvo Pardo, Corcos, and Ornelas (2012); and Conconi,

This paper investigates whether these two approaches are compatible within a single framework. Moreover, if both experience and productivity play a role in the foreign ownership choice, we wonder whether they are pure substitutes, or if they are rather complement factor, whose respective role depends on the host country characteristics, as one could assume.

This paper's main contribution is to disentangle the role of various determinants of MNE's ownership choices in foreign direct investments, at the firm and host country level. Its novelty lies in the investigation of a two-dimensional heterogeneity of multinational firms -in productivity and international experience- and its impact on MNEs' behaviour. Specifically one or the other endogenous determinant turns dominant according to host-country characteristics, so that we provide a unified framework of both "entry mode choice" and "integration dilemma" literatures. In addition, we provide empirical evidence from a panel of 6,321 French foreign affiliates in 87 foreign countries.

The paper is organized as follows : I review the "entry mode choice" and subsequent literature in the next section. The third section details the theoretical framework and the resulting selection effects. Section 4 presents the data, the sample and the variables we use for empirical examination, and gives descriptive statistics. The 5<sup>th</sup> section presents the estimation strategies and their results. At last section 6 concludes.

## **2 Related literature : Entry mode choice, or "fifty shades of FDI"**

The ownership structure of MNE's affiliates is at the source of a very abundant literature, although it has been broadly ignored by GHM and mainstream "global sourcing" frameworks. It has been the international business literature that coined the "entry mode choice" expression, referring to the organizational structure of an affiliate in a foreign market. Indeed a foreign investor faces multiple choices to engage physically in a new market, each corresponding to a given depth of commitment. The simplest, and most common way to represent this choice is the dichotomy between the choice to engage alone (Wholly Owned Subsidiaries, WOS) or setting

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Sapir, and Zanardi (2016) for engagement from export to FDI. To our knowledge no progressive internationalization model detail several modes of FDIs

up a joint venture (JV)<sup>4</sup>. For two decades now, this literature linked foreign direct investment and the boundaries of the firm issues as shows the survey done by Brouthers and Hennart (2007). Most of these contributions rely on the transaction cost framework (Williamson, 1979) to explain the different degrees of commitment in foreign markets<sup>5</sup> (Brouthers and Nakos, 2004; Hennart, 1988, 2010; Maekelburger, Schwens, and Kabst, 2012). The OLI approach, from the eclectic paradigm of Dunning (1988) is also used as an extension of the transaction costs theory (Hollenstein, 2005; Nakos and Brouthers, 2002). The general idea is that a formal alliance as an equity joint venture involves increased transaction costs. Thus, such an alliance is only worthy when the assets brought by the partner overcome the induced costs. These costs are often presented as effective losses, such as a profit sharing, but also cover a lot of potential costs and risks due to conflictual objectives or opportunistic behaviour of the partner. The principal-agent relationship is less straightforward since there are multiple parents. In addition, joint ventures involve opportunity costs since they are less adapted to set optimal intra-firm transfer prices and proceed to tax shifting, or to coordinate a geographically divided production process (Desai, Foley, and Hines Jr., 2004; Louri, Loufir, and Papanastassiou, 2002). The utility of a “parental advisory” of foreign affiliates could even increase with the development of global value chains and vertical integration, making WOS more adapted to current globalization as suggests Moran (2001).

## 2.1 Joint ventures and cultural distances

The international business literature deduces the advantages of international joint-venture by looking to where they are the most used. Indeed a significant proportion of the literature on organizational structures investigates why the entry mode varies across host countries, even in absence of any legal restriction. Some host countries characteristics seems to be associated with an increased use of IJV. One of the most discussed factor is the “cultural distance”, which measures cultural differences between home and host countries values that make domestic organization and process unadapted to new markets<sup>6</sup>. It has been repeatedly shown that this cultural

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<sup>4</sup>The acronyms WOFE and WOFIE are also used for wholly-owned foreign (invested) enterprise instead of WOS. Another common dichotomy is between M&A and greenfield investment, but is rather used in financial topics.

<sup>5</sup>The recurrent inscription in Williamson’s Transaction Costs framework shows the closeness with economics topics.

<sup>6</sup>As reports Shenkar (2001), “*cultural distance is a widely used construct in international business (...) .Presumably measuring the extent to which different cultures are similar or different (...) It is in the area of Foreign*

distance increases the proportion of joint ventures among FDIIs (Brouthers and Brouthers, 2001; Stopford and Haberich, 1978). As Shenkar (2001) puts it “the loosening of control in culturally distant locations was seen as a way of reducing uncertainty and information costs”. While control is less attractive, local cooperation gains in interest. Indeed firms in an unfamiliar environment would require a local partner’s experience, network and knowledge of the local market, its formal and especially informal institutions to reduce “cultural barriers” (Cheng, 2008). Investors would therefore increase the value of these immaterial assets brought by their partners, making joint ventures more attractive (Gatignon and Anderson, 1988; Kogut, 1991).

## 2.2 Integration and intellectual property rights protection

Close to the cultural distance faced by the MNE, its perception of the risk on the foreign country also determines the organizational structure. Economic -especially expropriation- and political risks are associated with a higher proportion of joint ventures among FDIIs (Henisz, 2000; Nunnenkamp and Andrés, 2014). Beamish (2012) uses the same uncertainty argument to explain why U.S firms opt more for joint ventures in southern and developing countries. Henceforth, the better contracting institutions increase the incidence of full integration or shared-ownership. This fear of intellectual property (IPR) leakage also explains the technology intensity gap observed between joint ventures and WOS, the latter being more productive as show Nunnenkamp and Andrés (2014). They argue that multinational firms prefer to renounce to a higher performance, when they suffer an asymmetry on the partner quality. This statement also emerges in theoretical models derived from the property rights theory of the firm, with notably Atalay, Hortaçsu, and Syverson (2014) and Bolatto, Naghavi, Ottaviano, and Kejzar (2017) view of integration not only as a tool to secure input flows, but also as a strategy to secure efficient transmission of technology across the various production stages, to limit imitation risks. As a consequence, the most technology advanced MNEs should be the most deterred from using joint-ventures (Javorcik and Saggi, 2010). Similar conclusions on the role of the contracting institutions result from applications of the property right theory (PRT), either in the outsourcing versus integration dilemma (Corcos, Irac, Mion, and Verdier, 2013) or within JV toward higher

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*Direct Investment(FDI), however that the construct has had its greatest impact”. However he criticizes the multiple proxies that has been used to capture it, and calls for a more rigorous approach of this concept.*

ownership shares (Eppinger and Kukharskyy, 2017).<sup>7</sup>

### 2.3 Resource scarcity and joint venture benefits

Simultaneously an increasing strand of the entry mode literature focused on internationalized small and medium enterprises' (SMEs) choice as noticed by Laufs and Schwens (2014). Evidences show that SMEs opt for "soft forms of internationalization" according to the word of Hollenstein (2005). More specifically, multinational firms that are SMEs are shown to opt more for joint ventures compared to full ownership of foreign affiliates. A first explanation lays on their lack of international experience. Because they are less experimented than large multinationals, they do not know the whole foreign market and institution specificities and prefer then to rely on some partners (Cheng, 2008; Maekelburger et al., 2012). More broadly, SMEs suffer from resource scarcity that goes beyond the only experience, and make partner's assets more attractive. This is particularly true for human and financial resources constraints SMEs face to invest and manage alone a foreign affiliate (Brouthers and Nakos, 2004; Calof, 1994; Nakos and Brouthers, 2002). Although we found no study on French SMEs, empirical evidences are brought for neighbouring countries, as Belgian SMEs internationalization constraints, revealed by De Maeseneire and Claeys (2012, table 2 p.414). Italian SMEs are also shown to opt more for softer internationalization forms. Mutinelli and Piscitello (1998a) (1998b, table V) reveal that, on the 1986-1993 period, 75% of FDI from firms having less than 500 employees were joint ventures, while this share goes to 60% for firms having from 500 to 1,999 employees and 56% for firms from 2,000 to 9,999 employees.

Given that the entry mode choice depends on endogenous characteristics of the investing firm, such as its size or its previous international experience, we are tempted to see another application of "new new trade theories" (NNTT), similar to those developed by Melitz (2003) and Helpman, Melitz, and Yeaple (2004). However, to our knowledge only few contributions recently used the total factor productivity (TFP) to examine the entry mode of a MNE. Using Japanese data, Raff, Ryan, and Stähler (2009) (2012) show that the more the investor is productive, the more it opts for complete ownership of its foreign affiliates. Using the same sample of Japanese

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<sup>7</sup>However, a very recent work by Bolatto et al. (2017) adds intangible assets feature on a PRT theoretical framework of integration versus outsourcing. Contrary to most works assuming material assets, they find the intellectual property rights protection to foster outsourcing in the case of complement assets (and insignificant effect for substitute assets).

MNEs from Toyo Keizai publications, Cieslik and Ryan (2009) show that even among joint ventures, TFP is associated with greater equity shares. In spite of their innovative aspect, these studies suffer from scarce and imprecise data. Indeed, they study the capital structure of already established affiliates, which does not exactly correspond to the “entry mode”, and only have a mere idea of its age as the panel waves are not yearly defined<sup>8</sup>. Also, they only focus on the FDI done by listed -and thus big- Japanese MNEs toward 22 OECD members host countries (20 for Cieslik and Ryan (2009)). They might miss some specificities of smaller multinationals and of investments on southern countries, where uncertainty is higher than in OECD destinations. At last they do not include the investor’s international experience in their analysis. Nevertheless, it is worth noting that their works represent the strongest link between the entry mode choice literature and traditional heterogeneous firms models. Their significant results legitimate our ambition to investigate the entry mode choice of new affiliates with NNTT tools such as a selection model of heterogeneous firms. This idea is also supported by Hayakawa et al. (2012) who include entry mode choice studies in their literature review of FDI and firm heterogeneity, assuming that the entry mode -as the host country- influences FDI sunk costs, and thus the productivity threshold in a Melitz (2003) approach.

## 2.4 Progressive internationalization process

A last strand of the literature deals with an endogenous determinant of the integration dilemma: the firm’s experience, seeing the internationalization process as a progressive pattern. This very basic idea has been popularized by the “Uppsala” model of Johanson and Vahlne (1977), which specifies that a firm internationalization is a gradual process where international trade is the first step before engaging in FDI. In this framework, joint ventures appear as an intermediate step toward deeper commitment, which turns to be confirmed in a large number of empirical studies (Anand and Khanna, 2000; Brouthers and Brouthers, 2001; Delios and Henisz, 2000; Kogut, 1991; Maekelburger et al., 2012). Kuo, Kao, Chang, and Chiu (2012) review the literature dealing with the progressive internationalization and entry mode choices. Some papers had shown that international experience can be decoupled from the firm self-commitment, as it could be brought by foreign shareholders (Filatotchev, Lien, Piesse, and

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<sup>8</sup>They however include the estimated age of the affiliate in their estimations, and found it to be insignificant on the ownership share held by the Japanese investor.



Strange (2007), 2009), or by poaching skilled employees that used to work for an internationalized group (Molina and Muendler, 2013). However, recent empirical findings show the firm-level experience to be highly correlated with the FDI decision. Gazaniol (2014) notably reveals that 95% of new industrial French outward FDIs are preceded by exports toward the host country and 73% by imports from this destination. In a renewed version of their model, Johanson and Vahlne (1990) insist on the progressive foreign commitment of the firms as the information asymmetry vanishes with previous experience. However their model lack precise formalization of heterogeneous firms in term of experience<sup>9</sup>. This gap is bridged by Conconi et al. (2016) and their formalized gradual model of internationalization under uncertainty, although it only focus on horizontal FDIs. Following Albornoz et al. (2012), they assume that uncertainty lowers a firm expected profitability abroad, as it blurs the actual foreign demand. Foreign investments would only be considered when the information asymmetry is reduced enough. Previous international experience reveals whether the foreign market worth a FDI. Contrary to the productivity in Helpman et al. (2004), but like the TFP in Antràs and Helpman (2004), previous experience is then a necessary condition for FDI, but not sufficient as the firm could be revealed to be unadapted to foreign demand. It is supposed that FDIs require more information than exports, so exporting is the first opportunity given to the firm to reach foreign market. Admitting a sequential model, firms can gain experience from one period to the following by exporting. It will provide additional information about the firm profitability abroad, such as the actual demand faced by the firm. At the next period, the firm could thus consider more precisely the opportunity to engage in FDI. However, even if the formalization is close to previous models of heterogeneous firms, Conconi et al. (2016) don't mention the role of productivity, as if the firms where only heterogeneous in terms of experience.

The rehabilitation of the progressive internationalization patterns over the static “trade versus FDI” dilemma, is full of insights because it correspond more to the actual development of multinationals where exports and FDI are complementary through time, and not only substitute, but it should retain the contribution of traditional heterogeneous firms models (i.e. the endogenous capability to bear some exogenous sunk costs), that represent one of the last few major steps on international economics. This is why we aim in this paper to evaluate the respec-

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<sup>9</sup>And conversely, most heterogeneous firms models assume firms to vary only in terms of productivity. More precisely they suppose that all heterogeneity could be captured through the Total Factor Productivity (TFP).

tive role of international experience and TFP in the foreign investment choices of multinational companies.

All the literature we reviewed contributes to a better understanding of the role of international experience and productivity to the FDI decision and depth. Both factors foster the worldwide expansion of firms. However what remains unknown is their respective contribution over the choice of the FDI structure, especially for southern-oriented FDI, which are less studied. We aim at bridging the remaining gap between “new new” trades theories and the “entry mode choice” of multinationals, and at providing intuitive explanation of self-selection of heterogeneous firms into internationalization’s commitment degree.

### 3 Basic setup

Consider a three countries world, with one domestic country ( $D$ ) and two foreign ones:  $W$  and  $E$ , where  $W$  benefits from a better legal contract enforcement than  $E$ . There is only one sector of differentiated goods and we further assume that the domestic market in this industry is only composed of heterogeneous MNEs engaged in a monopolistic competition. The final good to be produced requires one domestic input brought by the domestic firm, and a foreign input from  $W$  or  $E$ . The location choice of the MNEs is exogenous and fixed, such that some choose country  $W$  while other choose country  $E$ . The firms only choose their entry mode in the foreign market through a bargaining game: they can either fully integrate the foreign production plant or set up a joint-venture with a local producer<sup>10</sup>. We use the framework of partial contract incompleteness from Antràs and Helpman (2008). Specifically, in country  $l = W, E$ , there is only a fraction  $\mu_l$  of required tasks to produce the foreign input that are enforceable. Specifically we assume  $\mu_W > \mu_E$ , following the quality of legal institutions in each country. Simplifying Antràs and Helpman (2008), the contractual incompleteness in our model is simply given by  $\omega_l = 1 - \mu_l$ <sup>11</sup>

The novelty of this paper lies on the removal of two traditional assumptions of “global sourcing”- like models. First we assume the firm heterogeneity to impact the production of inputs, and no longer only their combination into outputs. However as we locate the production

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<sup>10</sup>Focusing only on multinationals firms, we assume they all have a sufficient enough productivity or rather that the selection effect already took place. Moreover, it allows us to ignore outsourcing strategy.

<sup>11</sup>Because we only focus on within-industry choice, we don’t consider the role of headquarter’s and supplier’s input intensity, relatively  $\eta$  and  $(1 - \eta)$  in Antràs and Helpman (2008)

of manufactured inputs abroad, there are no valuable reasons to think the two entities (mother and daughter) share the same productivity, because we know firms to be reluctant to transfer some of their technologies abroad (see discussion in section 2). Instead we assume an incomplete productivity transmission from the parent to the affiliate, due to some frictions. We detail this foreign productivity in section 3.1

Second, we reject the restrictive assumption that the firms only differ in terms of domestic productivity, and broaden the firm heterogeneity to second dimension: the international experience ( $I_i$ ), which impacts the ownership choice by two channels. (i): It improves the foreign productivity of the MNE (now different from the domestic productivity), by reducing the TFP transmission frictions. International experience helps the firm to transfer its productivity to its foreign affiliates, by allowing a better coordination between related entities notably. (ii): the international experience reduces the contract incompleteness  $\omega_l \equiv \omega_l(I)$ , with  $\omega'_l(I) < 0$ . This could be interpreted in several ways. A first explanation would be to consider that the previous internationalizations' experiences reduces the "cultural distance" to the foreign country, favoring full ownership as suggested in section 2.1. Staying closer to the Property Right Theory of the firm (PRT) framework, we would simply assume that the higher international experience of the firm, the higher its ability in writing internationally enforceable contracts and in suing a foreign partner, which reduces the liberty range of the intermediate good producer for non-cooperative behaviour. A last possibility, would be for experienced firms to identify and choose the most reliant partners, but the matching issue is only detailed in appendix A.1, which shows that international experience increases both the matching quality and the integration incentives.

Our conception of internationalization experience in reducing the foreign contractual incompleteness actually finds some supports among theoreticians of the contracts theory. Notably, Tirole (1999) discusses the assumption according to which the two bargaining parties face symmetric information, and therefore suffer from the same unforeseen contingencies. He suggests that they might not face a symmetric information, because expectations about the future are generally made "*by analogies with better known, past situations and combine them with some specificities of the current situation to reach some assessment of the expected return and riskiness*" (Tirole, 1999, p. 764). He deduces from there that the two contracting parties might not share the same probability distributions over payoffs, since "*They might have different views on how far one can push this analogy and to transpose past experience*" (*ibid*). Using this postulate

about unforeseen contingencies to depend on the firms' previous experience, we push the logic further and conclude that two different final-good producers will not share the same unforeseen contingencies, and therefore would not to suffer the same level of contractual incompleteness  $\omega_l \equiv \omega_{l,i}$ , now depending on firm-country association.

### 3.1 The MNE problem

#### 3.1.1 The profit function

Although the two partners play a non cooperative game, the ownership structure is chosen as to maximize joint-revenue by giving optimal incentives to each partner<sup>12</sup>. Since we focus on the choice of this ownership structure, it implies to maximize the total profit function, we represent in a reduced form by

$$\pi = (1 - \psi_k)(p - c)q - F_k \quad (1)$$

Where  $0 < \psi_k < 1$  represents the profit loss due to incomplete contracting. Since Antràs and Helpman (2008), we know these inefficiencies vary with  $k$  the ownership structure, such that one ownership share  $s^*$  minimizes these losses. Hence,

$$\psi'_k(s) > 0 \quad \text{iif } s > s^* \quad (2)$$

$$\psi'_k(s) < 0 \quad \text{iif } s < s^* \quad (3)$$

Such that if the solution of  $s^*$  is interior,  $\psi_k(s)$  is first decreasing then increasing in  $s$  once  $s^*$  reached. Micro-foundations of these inefficiencies  $\psi_k(s)$ , can be found in two recent working papers (Eppinger and Kukharsky, 2017; Joyez, 2017), with slightly different assumptions. Also, this parameter could embody both *ex-ante* and *ex-post* inefficiencies as suggests Bai, Tao, and Wu (2004), or only the *ex-ante* hold-up problem as in standard GHM line of models. Actually, the precise mechanism of these inefficiencies doesn't matter anymore, and we simply assume their existence, which could hardly be discussed.

Now let us examine the rest of the profit function. The  $c$  parameter stands for average

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<sup>12</sup>This happens through a lump-sum ex-ante transfer that binds the two parties' payoffs as explains Antràs (2014)

variable costs (fixed costs being of  $k$ -type, defined by  $F_k$ ), such that  $(p - c)$  represents the mean per unit profit. For ease of simplicity here, we suppose the headquarter services' ( $h$ ) costs to be null, such that all variable costs are summarized by  $m$ 's costs. Due to the incomplete productivity's transmission (and because  $m$  is necessarily produced abroad by assumption), we find the variable cost  $c$  to be a reverse index of the affiliate's productivity<sup>13</sup>. We now detail the mechanism of the imperfect productivity's transmission.

### 3.1.2 Imperfect productivity transmission

Denoting  $\theta_H$  the MNE (domestic) productivity, and  $\theta_l$  the foreign plant productivity, we assume:  $\theta_l = I \theta_H^e \theta_M^{1-e}$ , whereby  $0 \leq e \leq 1$  is the efficiency of the transmission from the multinational productivity. If this transmission is made impossible by some constraints ( $e \rightarrow 0$ ), we assume the foreign plant productivity to be completely determined by the local manufacturer productivity  $\theta_m$  and the foreign experience of the firm  $I$ <sup>14</sup>. We set  $I \geq 1$ , the lower bound at one indicates a complete absence of international experience, and reduces the productivity function to a Cobb-Douglas, that is to a weighted mean between parent firm and foreign partner. For simplicity we assume all possible foreign partners to share the same productivity level and normalize it to unity<sup>15</sup>. Such that the foreign plant productivity is actually  $\theta_l = I\theta_H^e$  with  $\theta_H > 1$  as we make the reliable assumption that the MNE productivity is higher than the foreign manufacturer own productivity. The effective foreign productivity crucially depends then on the efficiency of the transmission  $e$ . Efficiency of transmission depends on the uncertainty faced by the firm, since we know from literature on technology transfer toward foreign affiliates that parent firms are reluctant to transfer highly sophisticated technologies in unreliable environment, since they fear technological expropriation from an opportunistic partner (see Javorcik and Saggi (2010); Nunnenkamp and Andrés (2014), and discussion in 2). This uncertainty on the partner ability to appropriate protected technologies and production processes is here (inversely) proxied by  $\mu(I)$ , the level of contractual completeness, which itself depends on the previous international

<sup>13</sup>One might wonder why the MNE draw a productivity  $\theta_H$ , if it doesn't (directly) apply. First, as we'll later detail,  $\theta_l$  is derived from  $\eta_H$ . Second, in real-world this concept is clearer since MNEs produce both domestically and abroad. This distinction is therefore important to match our empirical investigation to follow, because we only capture the domestic productivity  $\theta_H$ , and not the foreign one  $\theta_l$ . We could have assumed the MNE to produce another good domestically, such as an homogeneous good, and  $\theta_H$  is their productivity in doing so.

<sup>14</sup>Contrary to the TFP, we assumed the experience to be directly accessible from the affiliates.  $I$  could be interpreted as the general competences given to the MNE by previous international experiences.

<sup>15</sup>Assuming heterogeneous partners is actually more relevant in a proper matching model, such the one detailed in appendix A.1, but is not essential to capture MNE decision about ownership structure.

experience of the firm  $I$ , as earlier discussed from Tirole (1999) point. Unambiguously, we have  $\frac{\partial e}{\partial \mu(I)} < 0$ , such that lower contractibility in the foreign country reduces the productivity transmission from the MNE, notably by deterring technological transfers because of the fear of intellectual property rights leaks.

### 3.2 Supermodularity analysis and selection effects.

Mrázová and Neary (2012) show that most micro-funded models of heterogeneous firms related to selection issues can be written in a reduced form, releasing most of their restrictive hypothesis (specific restrictions on the functional forms of preferences, technology, the distribution of costs, the countries symmetry, etc.). The sorting pattern only comes from a property of the profit function called “supermodularity” following Milgrom and Roberts (1990) term<sup>16</sup>.

We derive our reduced-form profit function (1) from Mrázová and Neary (2012)’s framework (see Mrázová and Neary (2012, table 2)). We therefore know the profit function in equation (1) to be supermodular in  $\psi_k(s)$  and  $c$  arguments whatever the sign of price elasticity, and for any level of demand. The forthcoming analysis is therefore unrelated to the output quantity  $q$ , considered now as an exogenous variable. In what follows, initial subscripts are removed for clarity purposes. Remaining subscripts refer to partial derivatives.

#### 3.2.1 The direction

Showing the function supermodularity is sufficient to give the *direction* of selections effects (Mrázová and Neary, 2012, p.12).

The supermodularity observed in  $\psi_k(s)$  and  $c$  parameters involves two cases:

1.  $\psi'_s > 0 \Leftrightarrow s > s^*$ , such that  $\pi$  is supermodular in  $s$  and  $c$
2.  $\psi'_s < 0 \Leftrightarrow s < s^*$ , such that  $\pi$  is submodular in  $s$  and  $c$

In any case, the supermodularity pattern indicates that most productive firms have increased incentives to reach  $s^*$  than low productive ones.

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<sup>16</sup>For a continuous function  $f(x, y)$  defined on  $\mathbb{R}^2$  and differentiable in  $x$  and  $y$  the supermodularity holds when  $\frac{\partial^2 f}{\partial x \partial y} > 0$ . In the case of a discontinuous function  $g(x, y)$ , the supermodularity prevails if  $\Delta_x g(x, y_2) \geq \Delta_x g(x, y_1)$  where  $y_2 \geq y_1$  and  $\Delta_x$  is defined as the finite (positive) difference between three values of a function evaluated at two different values of  $x$ ,  $x_1$  and  $x_2$  such that  $x_2 \geq x_1$ . Such a complementarity between two parameters of the profit function  $\Pi(x, y)$  is a sufficient assumption to claim for a sorting pattern, because firms with higher level of  $x$  would gain more than others in increasing  $y$ .

### 3.2.2 The effect of host-country

We now consider the role of host-country in the integration choice. As indicated earlier, we assume  $\mu^W > \mu^E$ , such that for a given firm, we know  $s^{*,W} > s^{*,E}$ . For illustrative purposes we assume the two countries to be different enough such that  $s^{*,W} > 1$  for all firms (even in absence of any international experience). Conversely, the initial level of  $s^{*,E}$  for non-experimented firms is intermediate such that  $0 < s^{*,E}|_{I=0} < 1$ .

First focus on country  $W$ . By assumption, we have that  $\frac{\partial \psi}{\partial s} < 0 \forall s \in ]0; 1]$ . We therefore have the second case evoked above where  $\pi$  is submodular in  $c$  and  $s$ , which implies  $\frac{\partial^2 \pi}{\partial s \partial c} < 0$ . In addition, we have  $\frac{\partial c}{\partial \theta_L} \cdot \frac{\partial \theta_L}{\partial \theta_H} < 0 \Leftrightarrow \frac{\partial c}{\partial \theta_H} < 0$ . Such that it is straightforward to deduce:

$$\frac{\partial^2 \pi}{\partial s \partial \theta_H} \geq 0$$

In country  $W$ , the affiliate's profit function is supermodular in the MNE ownership share  $s$  and its (domestic) productivity  $\theta_H$ , such that a selection effect arise in foreign ownership.

We deduce the first proposition:

**Proposition 1** *More productive firms select into higher ownership shares when the host-country contractual institutions are high enough.*

Now, consider country  $E$ , where initial  $s^*$  is interior, such that  $\frac{\partial \psi}{\partial s}$  sign is ambiguous. All other relations evoked for country  $W$  hold, such that, the sign of  $\frac{\partial^2 \pi}{\partial s \partial \theta_H}$  is also undefined.

A selection effect still exists in  $E$ , with higher productive firms self-selecting in ownership shares closer to  $s^*$ , but it is impossible to draw general conclusions on the respective level of ownership of top productive firms as compared to least productive ones, since the latter could either be below or above the threshold.

Yet, remind that in our model  $s^*$  is not entirely country-specific, but also depends on the firm's own experience, which reduces unforeseen contingencies.

Formally  $\frac{\partial s^*}{\partial \mu} \geq 0 \quad \frac{\partial \mu}{\partial I} \geq 0 \Rightarrow \frac{\partial s^*}{\partial I} \geq 0$ . Actually it is strictly positive before the corner solution  $s^* = 1$ , and becomes null afterward.

From first-order condition, we know  $s^*$  to be the solution of  $\frac{\partial \pi}{\partial s} = 0$ , such that  $\frac{\partial s^*}{\partial I} \geq 0$  implies

$$\frac{\partial^2 \pi}{\partial s \partial I} \geq 0$$

Following our assumptions on the two countries characteristics, we have  $\frac{\partial s^*}{\partial I} = 0$  in  $W$  and therefore  $\frac{\partial^2 \pi}{\partial s \partial I} = 0$ , such that no experience-based selection effect should be observed in a country without any uncertainty on contract enforcement.

To the contrary,  $\frac{\partial s^*}{\partial I} > 0$  and  $\frac{\partial s^*}{\partial I} > 0$  in  $E$ , where initially firms face some uncertainty. Hence, in country  $E$ , a selection effect arises with more experienced firms opting for increased ownership.

We deduce our second proposition:

**Proposition 2** *More internationally experienced firms select into higher ownership level of their foreign affiliates, especially in countries with low contract enforceability.*

Our model describes two extreme cases with two ideal type of countries, with either one or the other selection effect stressed. Hence one could believe the reality to be in between these two cases, with the two selection effects co-existing. Yet, in real-world, host-country are not randomly chosen, such that the host country quality of contractible institutions is not randomly distributed, but biased toward higher values, as reveals our further empirical observations (see table 2). From this postulate we derive our third proposition:

**Proposition 3** *On aggregate outward FDI flows, both selection effect might appear, but the productivity one should be stressed.*

In the two following sections we empirically investigate the model's propositions.

## 4 Empirical estimation : Data and variables

### 4.1 Sources and sample

The data on French foreign affiliates ownership come from merging LiFi survey (*INSEE*) with EAE-industry survey (*INSEE*). The first covers all firms possessing over 1.2 million euros of participation among other companies, firms above 500 employees or with a turnover superior to 60 million euros. LiFi details financial links between entities in the same group and informed us on the foreign affiliates of a French firm, and its ownership share. The EAE provided information on the parent firm. It covers each industrial french firms with at least 20 employees or turnover of 5 million euros. With those low thresholds, we certainly cover the majority of industrial firms



engaged in significant FDIs. Merging the two dataset using firm-level unique identifier (*siren*), allowed us to compare characteristics of the parent-firm and foreign ownership choices.

Sample restrictions were necessary to avoid some biases. First, we drop french firms that belong to foreign groups. We only kept majority-owned affiliates. We also drop observations in countries where only joint ventures or wholly owned subsidiaries were observed, as we want to be sure that the ownership percentage could freely vary up to full ownership. At last we drop 55 observations with a ownership of 50.01 percent as they correspond to arbitrary values in the LiFi data, when the exact control share is ignored<sup>17</sup>. We finally end up with 6,321 new french affiliates, opened between 2001 and 2007, from 1,410 investing firms, over 87 foreign countries.

## 4.2 Sample overview and descriptive statistics

Our firm-level dataset reveals the remaining heterogeneity across the 1,410 MNEs considered, with a sharp concentration of firm TFP and experience features, and large standard deviations. As reveals table 1 all our international activity variables are positively correlated to each other, and to the firm total factor productivity, which supports an accumulative internationalization process through experience and productivity.

Table 1: Descriptive statistics and correlation table

	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Control share (%)	93.68	13.96	1						
(2) ln TFP,(t-1)	10.40	1.47	0.1228	1					
(3) exports, in thd. euros,(t-1)	90.00	555.1756	-0.0009	0.3868	1				
(4) Nb. of foreign affiliates,(t-1)	4.39	8.79	0.0823	0.4220	0.2588	1			
(5) Nb. of WOS,(t-1)	3.38	7.16	0.1142	0.4441	0.2351	0.8669	1		
(6) Nb. of FDI destinations,(t-1)	3.84	5.43	0.1147	0.4429	0.2395	0.0.9363		1	
(7) Destination Rule of Law index,(t-1)	1.05	0.74	0.1173	-0.1325	-0.0733	-0.0600	-0.0684		1

Source : LiFi, EAE, Authors' calculations

To further investigate the potential link between MNEs heterogeneity and foreign ownership, we detailed in table (2) the proportion of wholly owned affiliates according to the investor's type or host countries categories. The investor's productivity is associated with a more frequent use of wholly owned subsidiaries compared to average, while lower TFP also reflects lower use of WOS. More precisely when considering the 95% of equity shares as the WOS threshold, the 10% most productive parent firms have the full ownership of 81.57% of their new foreign affiliates, whereas the least productive tenth of firms of them only entirely possesses 58.35% of them. This

<sup>17</sup>As it is explained in the dataset description provided by the INSEE : [http://www.webcommerce.insee.fr/FichesComm/PSMLIFI/P\\_TXCONTRA-LIFI.htm](http://www.webcommerce.insee.fr/FichesComm/PSMLIFI/P_TXCONTRA-LIFI.htm).

is in line with the proposition (1) of our model. The model prediction about experienced firms (proposition 2) is also supported by these descriptive statistics. A first-time foreign investor opts only in 72.28% of the cases for a WOS, while 76.88% of second or more foreign affiliates are fully owned. Besides investor type, the descriptive statistics reveal a 11 points drop in WOS share among FDIs between OECD and non-OECD destinations in favour of OECD host countries, in line with stylized facts depicted in the literature (Beamish, 2012).

Table 2: Wholly Owned Subsidiaries distribution across parent firm and destinations

	Nb. affiliates	WOS share (95%threshold)
All firms	6,321	75.83 %
1st foreign affiliate	1,450	72.28 %
2nd or more foreign affiliate	4,871	76.88 %
First FDI in the country	2,666	73.37 %
Previous presence in the country	3,655	77.62 %
10% least productive firms	365	58.35%
10% most productive firms	549	81.57%
In OECD countries	4,694	78.80%
In non-OECD countries	1,627	67.24%
In High Rule of Law destinations	4,913	78.42%
In Low Rule of Law destinations	1,408	66.76%

Source : LiFi, EAE, Authors' calculations

A similar gap is observed between high and low rule of law countries<sup>18</sup>. Unsurprisingly, the number of observations per types of countries also shows a clear preference of French firms for developed and less risky destinations.

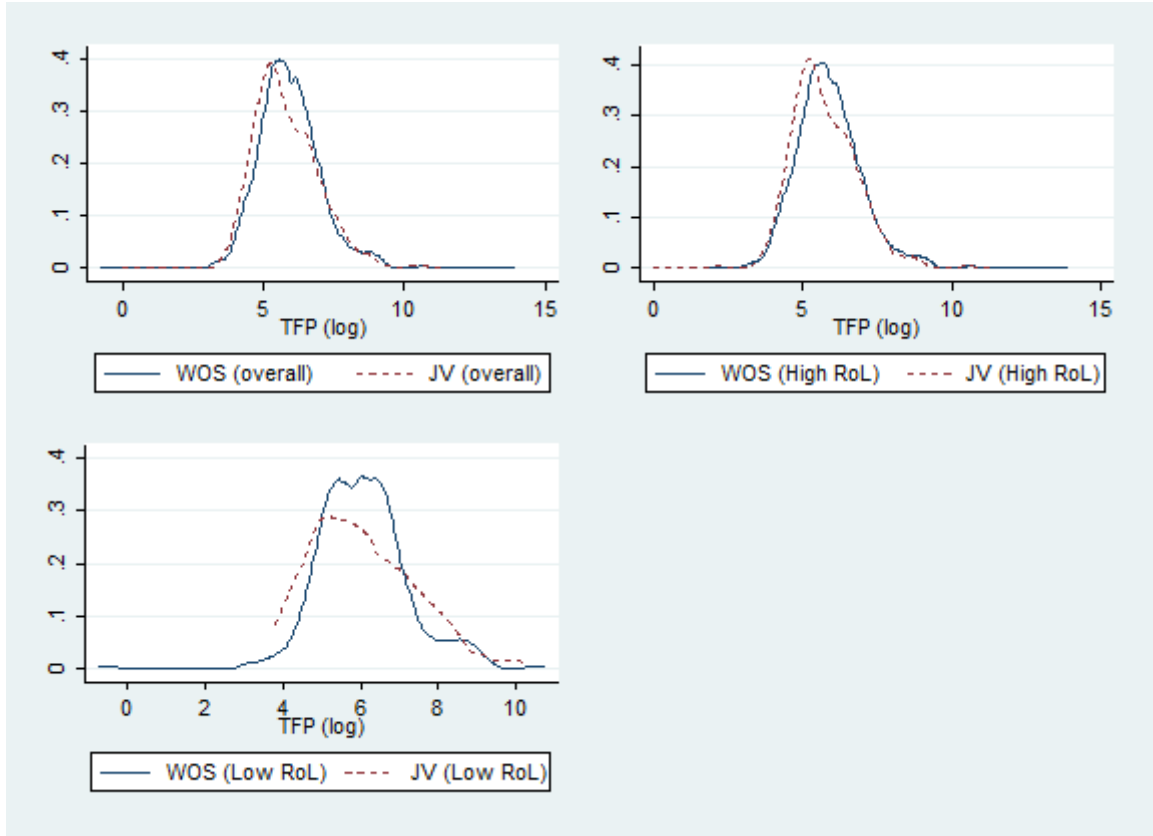
While WOS' investors display in average a higher TFP, this overall relationship is actually driven by the observation in high Rule of Law countries (the majority), but not from Law rule of law countries, as reports figure 1.

In this figure we see that the TFP distribution of WOS' and JV's parents (although some firms belong to both groups), is slightly higher for WOS parents overall (first row, left panel), and even more stressed in High rule of law countries (first row, right panel). However, in the lower half of institutional quality countries, the TFP distribution is frankly different. First it displays a lower kurtosis, with a wider range of frequent level of productivity, for both JV and WOS' parents. Although the TFP mode seems lower for JV parents, the low kurtosis implies that some productive firms also frequently opt for JV in those countries. No noticeable mean

<sup>18</sup>Countries with a low Rule of Law index (World Bank, Worldwide Governance Indicators) are those with an Rule of Law index above the median of our sample's countries in a given year. Conversely, low Rule of Law countries are the countries with an index below the median. See appendix B.2 for a list of countries in each category.

or median TFP differences between JV's and WOS's parents is therefore observable in poor institutional background.

Figure 1: TFP probability density function according to FDI structure and host countries



Kolmogorov - Smirnov (KS) tests of equality of distributions<sup>19</sup> confirm these differences (tab. 3).

Either when considering all countries or only High Rule of Law countries, we can reject at 1% of statistical significance level the null hypothesis of equal distribution of JV's and WOS' parents productivity; and conclude that the TFP distribution of WOS' parents stochastically dominates JV's parents one, having then a higher mean and median, but also higher values all along the distribution<sup>20</sup>. To the contrary, we fail to reject the equality of distribution in Law rule of law countries, and simply reject at 5% the reverse hypothesis that JV's parent TFP distribution is stochastically dominant. The exact same conclusion is drawn when considering non OECD

<sup>19</sup>The two sided test examines the null hypothesis of equal distributions  $H_0 : F(z) - S(z) = 0 \quad \forall z \in \mathbb{R}$  against  $H_1 : \exists z$  such that  $F(z) - S(z) \neq 0$ . The one-sided Kolmogorov-Smirnov test examines the validity of the following null hypothesis :  $H_0 : F(z) - S(z) \leq 0 \quad \forall z \in \mathbb{R}$  against  $H_1 : \exists z$  such that  $F(z) - S(z) > 0$

<sup>20</sup>A cumulative distribution  $F$  first-order stochastically dominates another distribution  $G$  iff  $F(x) \leq G(x) \quad \forall x$  and  $\exists x$  such as  $F(x) < G(x)$

versus OECD countries instead of Rule of Law group of countries.

This gives support to our Proposition (1), assuming a positive relationship between foreign ownership and TFP, except in low rule of law destinations.

To confirm (or infirm) the first descriptive statistics, and test our three propositions simultaneously, we run preciser econometric models.

Table 3: Kolmogorov-Smirnov tests of TFP distribution

destination	$H_0 : JV \leq WOS$	$H_0 : WOS \leq JV$	$H_0 : JV = WOS$
world	0.1192** (0.000)	-0.0127 (0.713)	0.1192** (0.000)
OECD	0.1784** (0.000)	-0.0027 (0.990)	0.1784** (0.000)
non-OECD	0.0887* (0.005)	-0.0480 (0.218)	0.0887 (0.011)
High Rule of Law	0.1434** (0.000)	-0.0032 (0.990)	0.1434** (0.000)
Low Rule of Law	0.1390* (0.013)	-0.0104 (0.976)	0.1390 (0.027)

D-stats are reported as coefficients, P-values are in parenthesis  
\* and \*\* correspond to significance at 5% and 1%

## 5 Estimation strategies and results

### 5.1 Probability of full ownership

As documented by Ai and Norton (2003), interactions terms in non-linear models such as Logits and Probits, are hardly interpretable<sup>21</sup>. Instead of adjusting the computed coefficient to report exact marginal effect (additive scale), we report the odds ratios (i.e. multiplicative scale) in our tables. Although they are equal to the exponent of coefficients, their interpretation on a multiplicative scale does not suffer any bias, because the bias lies on the coefficient not to be equal to the true marginal effects. See Buis (2010) for more details). Interpretation of odds ratio may be unusual since they are always positive, and must be compared to one. An odd-ratio above unity indicates a positive coefficient, whereas a value below unity implies a negative relationship. To ease the odds ratios interpretation, we change the logarithm base for non-linear models to base two. The odds ratio are therefore associated to the probability increase when independent variables are multiplied by two.

Since the JV versus WOS dichotomy is the most common way to look at the entry mode choice in international business literature we reviewed, we first start by evaluating the probability

<sup>21</sup>“The magnitude of the interaction effect in nonlinear models does not equal the marginal effect of the interaction term, can be of opposite sign, and its statistical significance is not calculated by standard softwares”, Ai and Norton (2003, p. 123)

for the affiliate to be a WOS via a Logit estimation, using both firm-level and host-country determinants (table (4)). Column (1)-(4) reports the results of model (4):

$$Y = a_0 + \log(Exp_{.i})_{(t-1)} + a_2 * \log(TFP_i)_{(t-1)} + a_3 * RoL_{k(t-1)} + a_4 * Z + \epsilon \quad (4)$$

Where  $Y$  is here the probability of WOS,  $Exp_{.i}$  is the internationalization experience, here proxied by the number of foreign affiliates. The  $i$  subscripts indicates that this is a firm-level variable, while the  $k$  indicates a country-level variable.  $TFP$  stands for Total Factor Productivity, and is measure all along this article with the same method from Wooldridge (2009)<sup>22</sup>. The Rule of Law index from the World Bank’s Worldwide Governance Indicator is use to proxy the institutional quality in variable  $RoL$ . It is based on surveys of businessmen and citizen, and therefore directly related to the agents’ perception of the enforceability of contracts. All variables are reported with a one-year lag, to be closer to their values at the time the decision has been taken, and (RoL) prevent any reverse causality, notably with the TFP. The parameter  $Z$  stands for a vector of dummy variables capturing host-country, and firm-level fixed effects when included in the model. In absence of any fixed effects,  $Z = 0$ <sup>23</sup>.

What changes between columns (1)-(4) is the absence of any fixed effects in (1), while both host-country and firm-level fixed effects are jointly included in the remaining regressions. Moreover the scope of the regression is restricted to High rule of law countries in (3) and to Low Rule of Law ones in (4). Yet, these four estimations support our third hypothesis, with a positive and significant influence of previous international experience. When the number of affiliates doubles, it increases the probability for the firm to open a WOS by 8% in High rule of law countries but 13% in low ones, confirming also hypothesis (2). While this effect might seem low, two reasons could explain that. First, the probability of opening a WOS is already high in average, since this is the most frequent option for all types of firms, and in almost all countries, hence the probability to increase it will still be relatively low with such a high baseline. The second possibility is that more than half of the sample has two or less previous foreign affiliates, such that doubling their number results in a low increase in absolute values.

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<sup>22</sup>Using PRODEST Stata module from Rovigatti and Mollisi (2016). This module also allows to compute Levinsohn and Petrin (2003) estimation, but choosing either one or the other had not significant impact on our results, since the correlation coefficient between the Wooldridge method and the Levinshon & Petrin one was about 0.967

<sup>23</sup>A previous version of this paper estimated random-effects, using parent-firm clusters to limit heteroskedasticity bias, and led to sensibly similar results. However, following the suggestions of an anonymous referee from the IER, I opted for firm-level fixed effects.

At last, the number of foreign affiliates could also capture only partially the firm’s international experience. Total factor productivity is also associated with increased probability of opening a WOS, except in low Rule of Law countries, where its effects turns non significant. Doubling the firm’s TFP is associated with an increase of 28% of opening a WOS in High rule of Law countries. This also confirms hypothesis (1), while (3) is confirmed in columns (1) and (2).

The host country Rule of Law (RoL) plays a very important role in estimation (1), far beyond endogenous variables. Twice the rule of law is associated with an increase of 43% for the new affiliate to be a WOS, confirming what table (2), and international business literature on cultural distance first indicated. Yet, as one could expect this effect completely disappears as soon as we add host-country fixed effects, meaning that cross-countries differences in RoL have more impact than within countries variability, which seems logical since most of its variance is between countries. The RoL indicator shows very little variation within a seven-years period of time for a given country. We even observe a quite important negative effect of increasing RoL within high RoL countries. Although the significance of this effect remains low, its repetition is intriguing. It seems to show that when the contractibility within a country increases high enough, the MNE tends to opt more easily for JV. We presume it could be because when a certain level of RoL is reached, the MNE is able to engage in a JV without risking any expropriation or similar issues. However, since this question is not at the core of this paper, contrary to endogenous determinants, we will not go any further discussing this effect.

The two last column are designed to test jointly hypotheses (1) and (2). Indeed, when preceding to sub-sample analysis as we did in columns (3) and (4), we let the fixed effects vary across the two estimations, for a given country (some are in both sub-sample, see appendix (B.2)), and moreover for a given parent-firm. To overcome this, we use interactions terms. Column (5) reports linear interaction between RoL and firm-level determinants, as details the model in eq. (5), whereas estimation in column (6) uses interaction of firm level variables over two dummy dichotomous variable indicating High or Low Rule of law countries, as shows the model in eq. (6)

$$\begin{aligned}
 Y = & a_0 + a_1 * \log(Exp.i)_{(t-1)} + a_2 * \log(TFP_i)_{(t-1)} + a_3 * RoL_{k(t-1)} \\
 & + a_4 * \log(Exp.i)_{(t-1)} * RoL_{k(t-1)} + a_5 * \log(TFP_i)_{(t-1)} * RoL_{k(t-1)} + a_6 * Z + \epsilon
 \end{aligned}
 \tag{5}$$

Table 4: Logit (Probability of WOS)

	World (1)	World (2)	High RoL (3)	Low RoL (4)	World (5)	(6)
$\log_2$ Nb. for. aff. (t-1)	1.118 (10.20)***	1.074 (2.24)**	1.079 (1.96)*	1.130 (1.86)*	1.136 (3.63)***	
$\log_2$ TFP (t-1)	1.105 (10.87)***	1.232 (2.40)**	1.277 (2.30)**	0.997 (0.02)	1.186 (1.94)*	
$\log_2$ Rule of Law (t-1)	1.434 (26.91)***	1.063 (0.74)	0.691 (1.73)*	0.597 (1.57)	0.732 (1.72)*	0.905 (1.00)
$\log_2$ RoL*Nb. for. aff.					0.949 (4.07)***	
$\log_2$ RoL*TFP (t-1)					1.033 (3.27)***	
$\log_2$ TFP(t-1)*High RoL						1.232 (2.40)**
$\log_2$ TFP(t-1)*Low RoL						1.181 (1.90)*
$\log_2$ Nb. for. aff. (t-1)*High RoL						1.048 (1.39)
$\log_2$ Nb. for. aff. (t-1)*Low RoL						1.122 (2.89)***
R <sup>2</sup>	0.05	0.24	0.21	0.26	0.24	0.24
Nb. Obs	22,934	22,932	18,108	4,809	22,932	22,932
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

$$\begin{aligned}
Y = & a_0 + a_1 * \log(TFP_i)_{(t-1)} * HighRoL + a_2 * \log(TFP_i)_{(t-1)} * LowRoL \\
& + a_3 * \log(Exp_i)_{(t-1)} * HighRoL + a_4 * \log(Exp_i)_{(t-1)} * LowRoL \\
& + a_5 * RoL_{k(t-1)} + a_6 * Z + \epsilon
\end{aligned} \tag{6}$$

Column (5) supports all of our hypotheses: Both international experience and TFP increase the probability of a WOS, as predicted in proposition 3. Moreover, the influence of TFP increases with host-countries' RoL, whereas the influence of foreign affiliates decreases. Similar conclusions are also driven from column (6): while interacted TFP odd ratio is above unity with both High and Low RoL dummy, the effect is substantially higher in countries with good contractual institutions, with a probability increased by 23% when the firms TFP doubles, against 18% in other countries, with also a lower significance. The reverse is observed concerning the number of previous affiliates, which odd ratio is only significant when interacted with law rule of law dummy, and highlights an increase of 12% of the WOS probability when doubling its number of foreign affiliates, in line with what found in (4).

This preliminary analysis confirms our intuitions and provides interesting supports for our

propositions. Yet it ignores ownership variations within joint-ventures, whilst switching from JV to WOS is only an extreme realization of our predictions. We therefore proceed to preciser analysis on the exact ownership share, first via traditional OLS, then we run a Tobit model, better adapted to censored variable such as ownership share, bounded below 100 percent (Tobin, 1958).

## 5.2 Linear models

Before going any further in detailed analysis, we should discuss a potential bias stressed by multicollinearity, as the *TFP* and *Exp.* variables are likely to be correlated: TFP is known to foster exports and FDIs. From a theoretical perspective though, we believe that narrowing the scope of the analysis to multinational firms only reduces the correlation between internationalization experience and productivity, because all firms have some of the first, contrary to traditional analysis done in wider panel of firms. More important, even though they are correlated, their effect over foreign ownership is not exactly the same since it goes through different channel as explained above: TFP enables higher fixed-costs operations, while experience provides immaterial assets required to manage alone a foreign business. Such that, for instance, the remaining variability of internationalization experience for a given level of TFP would matter, and even more where those immaterial assets are required. If the two variables were not included, one of the two channels would be captured by the firm-level fixed effects and residual term. While the first is not much problematic, aside not being displayed as the fixed effects act as “black boxes”, the second would lead to endogeneity (omitted variable bias), which could bias the coefficients, while multicollinearity (if any) only affects their significance, through a higher variance. At last, and probably the most important point, is that if the two variables were actually capturing the same thing (i.e. that the firm is highly productive), we would not expect them to display systematic differences of level and significance according to the type of host country as our propositions predict<sup>24</sup>.

From an empirical perspective now, we chose to add progressively each one of the endogenous regressors in the OLS model, to make sure they both capture a distinct effect on ownership share (especially noticeable in table 6). The joint inclusion of the two regressors only slightly lowers

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<sup>24</sup>It even predicts opposite signs of this two variables, when interacted with the host country rule of law levels, which is already verified in table (4).



the coefficients' magnitude and significance, which confirms the two variables being correlated, but not enough to lead to severe multicollinearity . Nevertheless, we note this potential multicollinearity could lead lower statistical significance of the coefficient, and hence report up to the 10% statistical significance in our tables. The fear of severe multicollinearity is also rejected by the analysis of the mean variance inflation factor (VIF), only of 1.37 in the model from column (6) in table (5), far below values to be concerned of<sup>25</sup>. Moreover, the correlation coefficient between the TFP and Experience are between 0.38 and 0.44 depending on the experience proxy retained (see table (1)), confirming a positive correlation, but not as high as one could expect.

This point being made, we can focus on the estimation results. Since interpretation of interactions' coefficients is not problematic in linear models, we kept traditional log-log estimations, with natural logarithm values of the variables, and reported the coefficients.

Table 5 reports result for a worldwide estimation of model (4), with  $Y = \ln(s)$ , where  $s$  is the ownership share expressed in basis points; and with stepwise inclusion of firm-level variables. Each firm-level variable shows positive and significant influence over ownership share when estimated together without any fixed effects. Including fixed effects (in column (2), (4) and (6)) surprisingly does not change any of the endogenous variables' coefficients, but increases their significance. Again, the host country rule of law seems to foster the MNE ownership over its subsidiaries in absence of host country fixed effects. Yet this influence vanishes when controlling the host country and the parent-firm unobserved characteristics.

The worldwide results support the propositions of our model : most productive and experienced firms tend to engage more deeply in new affiliate control through increased ownership. The third hypothesis is tested via host-countries sub-sample analysis and interaction terms in table (6). More precisely columns (1)-(6) show the result of the model in eq. (4), with stepwise inclusion, and over host-countries sub-samples by Rule of Law levels. This analysis gives more accurate results. In the sub-sample made of higher rule of law destinations, the ownership share of foreign affiliates is shown to be positively impacted by the investing firm's TFP, whose elasticity overwhelms the previous experience influence, which turns only significant at 10% when considered next to the TFP. In lower rule of law countries, only the experience proxy appears

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<sup>25</sup> $VIF = \frac{1}{1-R^2}$  where  $R^2$  is the R-squared from linear regression of one predictor over all others. Like tolerance there is no formal cutoff value to use with Vif for determining the presence of multicollinearity. Values of Vif exceeding 10 are often regarded as indicating multicollinearity (Wooldridge, 2012, p.98), but in weaker models, which is often the case in logistic regression; values above 2.5 may be a cause for concern argues Paul Allison.

Table 5: Panel OLS estimations - Worldwide

	(1)	(2)	(3)	(4)	(5)	(6)
ln Nb. for. aff. (t-1)	0.006 (2.98)***	0.006 (3.16)***			0.005 (2.51)**	0.005 (2.66)***
ln TFP (t-1)			0.015 (2.58)***	0.015 (2.61)***	0.013 (2.25)**	0.013 (2.27)**
ln Rule of Law (t-1)	0.022 (6.15)***	0.011 (0.97)	0.022 (6.18)***	0.012 (1.00)	0.022 (6.17)***	0.012 (1.01)
R <sup>2</sup> (overall)	0.03	0.04	0.03	0.05	0.04	0.05
Nb. Obs	22,934	22,934	22,934	22,934	22,934	22,934
Nb. aff.	6,318	6,318	6,318	6,318	6,318	6,318
Nb. sirtg	1,409	1,409	1,409	1,409	1,409	1,409
Firm-level Fixed Effects	No	Yes	No	Yes	No	Yes
Country Fixed Effects	No	Yes	No	Yes	No	Yes

Coefficients are reported in first row  
t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

to be significant, either alone or with the TFP. The magnitude of the coefficient also increased, but remain low. We especially see that none of these variable suffers from the inclusion of the other, in neither sub samples. Therefore, the step-by-step inclusion of firm-level explanatory variables is not reproduced in further analysis.

While the continuous interaction estimation of model (5) (column (7)) only partially verifies our hypothesis (only the experience side is confirmed), we find more convincing support of our third hypothesis in column (8) of table (6), estimating model in eq. (6).

Table 6: Panel OLS sub-samples and interacted estimations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	HighRoL	HighRoL	HighRoL	LowRoL	LowRoL	LowRoL	World	World
ln Nb. for. aff. (t-1)	0.05 (2.27)**		0.04 (1.90)*	0.12 (3.88)***		0.011 (3.69)***	0.010 (3.63)***	
ln TFP (t-1)		0.012 (2.16)**	0.011 (1.91)*		0.017 (1.07)	0.011 (0.70)	0.011 (1.57)	
ln Rule of Law (t-1)	-0.028 (1.93)*	-0.027 (1.86)*	-0.027 (1.86)*	-0.031 (1.70)*	-0.033 (1.85)*	-0.030 (1.67)*	-0.003 (0.09)	0.005 (0.35)
ln RoL*Nb. for. aff.							-0.005 (2.36)**	
ln RoL*TFP (t-1)							0.002 (0.86)	
ln TFP(t-1)*High RoL								0.013 (2.26)**
ln TFP(t-1)*Low RoL								0.010 (1.67)*
ln Nb. for. aff. (t-1)*High RoL								0.03 (1.47)
ln Nb. for. aff. (t-1)*Low RoL								0.012 (3.84)***
R <sup>2</sup> overall	0.02	0.04	0.04	0.07	0.07	0.07	0.05	0.05
Nb. Obs	18,110	18,110	18,110	4,824	4,824	4,824	22,934	22,934
Nb. Aff.	4,891	4,891	4,891	1,422	1,422	1,422	6,318	6,318
Firm-level Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Coefficients reported in first row  
t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

Table 7: Tobit estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low RoL	World	World
ln Nb. for. aff. (t-1)	0.029 (10.86)***	0.026 (9.77)***	0.021 (6.32)***	0.038 (7.95)***	0.033 (9.12)***	
ln TFP (t-1)	0.027 (12.38)***	0.029 (12.97)***	0.040 (15.01)***	-0.000 (0.03)	0.011 (3.61)***	
ln Rule of Law (t-1)	0.096 (28.87)***	0.008 (0.48)	-0.131 (3.28)***	-0.071 (1.43)	-0.226 (7.24)***	-0.051 (2.60)***
ln RoL*Nb. for. aff.					-0.009 (2.89)***	
ln RoL*TFP (t-1)					0.021 (8.57)***	
ln TFP(t-1)*High RoL						0.032 (14.04)***
ln TFP(t-1)*Low RoL						0.020 (7.95)***
ln Nb. for. aff. (t-1)*High RoL						0.025 (8.60)***
ln Nb. for. aff. (t-1)*Low RoL						0.030 (5.97)***
Pseudo R <sup>2</sup>	0.06	0.10	0.09	0.09	0.10	0.10
Nb. Obs	22,934	22,934	18,110	4,824	22,934	22,934
Nb. aff.	6,318	6,318	4,891	1,422	6,318	6,318
Nb. uncensored obs	8,775	8,775	6,312	2,463	8,775	
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odds ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

The results of the Tobit model, ran to overcome the bias due to the bounded nature of ownership share are shown in table (7). As in all following tables, columns (1)-(4) are variations of the model in (4), column (5) displays the results of model (5), and the sixth column those of model (6). Most of the Tobit estimations yield very similar results, although the coefficients are slightly lower. Column (5) shows more convincing results of linear interaction model, than the OLS did, with significant role of TFP. Column (8) shows that both factor still play a role on each countries sub-samples, but with a reverse importance, as predicted in our two first propositions.

### 5.3 Ordinal ownership classes

Although linear models such as the traditional OLS or Tobit regressions are often used to investigate ownership strategies -some papers even only display such estimations as Asiedu and Esfahani (2001) or Desai et al. (2004)- and give results in line with our model, we push the empirical analysis further and release the assumption of linear ownership control. Following Raff et al. (2009) we present non-linear models after traditional linear estimations. Actually, the ownership share of foreign affiliates is more likely to be non-linearly associated with the

effective operational control over it, with the possible existence of thresholds values in equity shares (e.g. 50%, 67%; 75%, etc.). Hence, we reshape our dependent variable into a categorical variable. This assumes classes of ownership shares (between two thresholds) within which, varying ownership share has no effect. Only reaching another ownership threshold (upgrading to another class), would give the MNE more decisional power and lead to substantial change into the partners' behaviour, such that we now only focus on this ownership classes change. Still from a theoretical perspective, adapting our simple model to discontinuous ownership categories is straightforward since the supermodular analysis was traditionally applied to non-linear functions (Milgrom and Roberts, 1990; Mrázová and Neary, 2012).

From an empirical point of view, the continuous dependent variable  $s$  must now be reshaped into an ordinal one. Rather than choosing arbitrary equity levels as ownership threshold, we deduced them from the actual distribution of ownership share of foreign affiliates (Appendix B.1 details how ownership thresholds were empirically identified.). Alternative thresholds are further considered in appendix B.4.

Ordered logit models are the more appropriated estimation strategy for discrete ranking with more than two choices (Chu and Anderson, 1992). The estimation strategy follows the one from linear models : first an overall analysis, then duplicated on sub-samples and at last two interacted regressions. Adopting non-linear model, we display odds-ratios and use  $\log_2$  transformed variable as explained above.

Table 8 displays the results of the ordered logit. At the world scale, the two firm-level variables are shown to increase foreign ownership. When controlling for firm-level and host countries fixed-effects, Doubling the TFP is associated with an rise of 22% to reach the upper ownership class. However, surprisingly this coefficient is not significant when restricting only to high rule of law countries. However, assumption 3, finds some supports in column (8). Increasing TFP by 100% results in an increased probability to yield the upper ownership class by 22% in High rule of law destinations, versus 17% in low RoL countries, with a lower significance level. The reverse is observed for the role of previous foreign affiliates. While doubling their number helps by 9.7% to reach the upper class of ownership in Low RoL countries, its magnitude in High RoL countries is only its half, with 4.6%, and it lacks significance.

Table 8: Ordered Logit

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low RoL	World	World
$\log_2$ Nb. for. aff. (t-1)	1.121 (3.70)***	1.066 (2.20)**	1.066 (1.73)*	1.140 (2.95)***	1.112 (3.30)***	
$\log_2$ TFP (t-1)	1.109 (2.97)***	1.219 (2.21)**	1.077 (0.70)	1.052 (0.32)	1.183 (1.81)*	
$\log_2$ Rule of Law (t-1)	1.416 (11.08)***	1.055 (0.33)	0.939 (0.29)	0.665 (1.69)*	0.769 (0.69)	0.903 (0.61)
$\log_2$ RoL*Nb. for. aff.					0.958 (2.02)**	
$\log_2$ RoL*TFP (t-1)					1.028 (1.35)	
$\log_2$ TFP(t-1)*High RoL						1.222 (2.30)**
$\log_2$ TFP(t-1)*Low RoL						1.177 (1.81)*
$\log_2$ Nb. for. aff. (t-1)*High RoL						1.046 (1.12)
$\log_2$ Nb. for. aff. (t-1)*Low RoL						1.097 (2.41)**
Pseudo R <sup>2</sup>	0.03	0.24	0.28	0.32	0.25	0.26
Nb. Obs	22,934	22,934	18,110	4,824	22,934	22,934
Nb aff.	6,318	6,318	4,891	1,422	6,318	6,318
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

## 6 concluding remarks

We described a model of ownership choices in foreign direct investments inspired from several literatures. The affiliate's ownership level results from a tradeoff between incentives to integrate (for intellectual property protection, and better coordination), ability to overcome investment sunk costs (depending on the firms' TFP), and the need of a local partner specific non-contractible assets (according to host countries' contract enforceability, and firms' own experience). Hence, heterogeneity between multinational firms greatly influences the ownership strategy, albeit with a noticeable variability across host countries. In line with our predictions and based on an extensive French dataset of over 6,300 foreign subsidiaries, we show that for an investment in a known and stable environment, the more productive firms would choose higher control of their foreign affiliates equity, whereas no similar sorting pattern is noticeable in destinations with fewer legal protection. However, this selection effect remain crucial as most of French FDIs, and especially first FDIs, are targeting developed countries with high institutional quality (UE, USA and other OECD members), where the productivity sorting pattern is veri-

fied. This productivity selection should therefore affect more the extensive margins of first-timer foreign investors rather than the expansion of already internationalized MNEs.

An international learning-by-doing process toward increased ownership is also observed, as already underlined by international business literature, except this is the first time -as far as we know- that it is revealed once controlled for the firms' TFP. This progressive internationalization is stressed for investing in uncertain destinations. The gradual pattern of internationalization strategies that recent studies highlighted from arm's length trade to FDI, where both experience and productivity play a role, is therefore continued by a second progressive commitment, among MNEs and within FDI strategies. The depth of international commitments differs from soft strategies of low productive and inexperienced firms relying much on their partners, to bold and autonomous strategies of more productive and experienced MNEs. We also show the firm experience and its TFP not to be simple substitutes, but rather complementary features that do not provide the firm the same advantages.

One of the limit of our analysis would be not to consider previous internationalization steps than joint-ventures. In real-world, several intermediary solutions exist between direct exports and joint-ventures, such as formal alliances with local partner (without the equity component), or even representation and sales offices, that are local structures, but are hardly observable in statistics as they do not constitute a proper legal entity on their own (contrary to an affiliate). Actually the official form of joint venture (equity sharing) is only one particular and very restrictive type of contractual partnership (but the easier to detect). This certainly explains why a large proportion of inexperienced firms do opt "directly" for wholly owned subsidiaries. They probably have already concluded other types of commercial partnership and agreements we cannot observe, that reduce or warranty the risks or the costs they face, prior to their first FDI. However having robust results when only considering official equity joint venture strengthens the assumption of an effective gradual pattern, as the other kinds of partnership should decrease the differences observed in experience and productivity across the equity commitment degrees.

Welfare implications could also be drawn from this paper. While a consensus starts to emerge concerning a local spillover premium from joint-ventures compared to fully foreign owned affiliates because they favor local participation and sourcing, and use technologies easily adopted by local producers (see (Iršová and Havránek, 2011, 2013) surveys)<sup>26</sup>; it would imply that

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<sup>26</sup>Although this is a much debated topic. Recent evidences also show that majority-owned subsidiary provide

developing countries would benefit more from foreign investments done by middle productive MNEs or first-time foreign investors than by major multinationals, because these firms are more likely to engage in JVs. In terms of policy implications to foster local development, developing countries should focus on attracting middle sized MNEs. This conclusion is yet to be taken cautiously, and calls for further research specifically dedicated, but are worth to be discussed.

Also, this paper shows how the point made by Mrázová and Neary (2012) allows to investigate double-sided firm heterogeneity into selection models. Previous findings that only considered TFP enhancement effect over foreign ownership from Ciešlik and Ryan (2009); Raff et al. (2012) could be integrated as extreme cases of our framework results, because it only concerns affiliates in OECD host countries. The surrounding number of joint-ventures in southern countries detailed by Beamish (2012) also fits into our model.

To conclude, the interaction between firm-level and host-country factors could be more puzzling than one could think of, as shows our investigation over the various experience types, and calls for further research. We know some to be under progress, notably by Eppinger and Kukharskyy (2017), who investigate the interaction between (industry-level) relationship-specificity of inputs and legal protection in host country to determine the ownership choice. This finding is in line with ours under the reliable assumption of a higher degree of relationship-specificity of inputs within industry, for higher productive firms. We hope these evidences to be striking enough in highlighting the complexity of underlying international integration choices, such that further research would systematize these interactions and no longer investigate firm-level and host-country determinants separately.

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higher spillover in the long run through the higher technological level they are using, while minority-held subsidiaries would have more immediate spillover but last less (Merlevede, Schoors, and Spatareanu, 2014). But majority-owned could still be JVs, and their paper remain silent on fully foreign owned affiliates. Some also distinguish backward (vertical) spillovers from intra-sectoral (horizontal) ones (Javorcik and Spatareanu, 2008; Merlevede et al., 2014), which complicates the general statement above (although not in frontal contradiction with it). In the current state of research, JV are likely to favor immediate and backward oriented spillovers compared to WOS, if not overall spillovers.

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## A Theoretical appendix

### A.1 Model of matching quality following Rauch & Trindade (2003)

Rauch and Trindade (2003) address another issue of international joint-venture : the matching quality between partners<sup>27</sup>. We didn't implement this on our main model for clarity purposes. However we show here that it is perfectly adaptable in supermodularity analysis like ours. Indeed, Rauch and Trindade (2003) insist on the quality of information -as suggests their title- for the matching success. The better information  $I$ , enables the multinational firm  $i$  to chose an adequate partner  $j$ , such that the quality of match  $z_{ij}$  increases (up to 1/2 according to their unit length circle modeling of matches), increasing in turn the output quantity from the match  $y_{ij}$  (see equation (1) from Rauch and Trindade (2003) ). From a formalized perspective, this parameter  $z$  impacts all operating profits (which are not further detailed). Let's reproduce their equation (2) :

$$\Pi_{ij} = z_{ij} * \pi$$

Where  $\Pi_{ij}$  the total profit from the match (before the profit-sharing). In their model, each producer is assumed to receive half of the profits  $\Pi_{ij}$  such that the MNE earns  $\frac{1}{2} * z_{ij} * \pi$ .

Adapting it to our model is straightforward. We simply detail the operating profits to our profit function (1):  $\pi = (1 - \psi_k)(p - c)q - F_k$ . Also, we replace the 50-50 sharing by a share  $\beta_h$  of final revenue that goes to  $H$ , which takes into account the bargaining game of the two parties, and is increasing in  $s$ , since  $s$  secures the disagreement payoffs (see chapter 1). We then add the  $z$  parameter of matching quality, that depends on the information held by the firm<sup>28</sup>. Noting  $\Pi_i$  the final profit for the firm  $i$ , we find:

$$\Pi_i = z_{ij}(\chi) * \beta_h(s) * ((1 - \psi_k)(p - c)q - F_k)$$

We can therefore directly conclude to similar sorting patterns than our initial model through the supermodular analysis. The submodularity between  $c$  and  $s$  is not perturbed by the addition of  $z$ , hence more productive firms always have higher incentives to integrate. The selection effect of experienced firms (benefiting from greater information) is strengthened by the addition of  $z(I)$  in our profit function.

Experience plays thus an ambivalent role in this framework, favouring better matches while reducing the attraction of joint venture<sup>29</sup>. However, this is not as contradictory as it appears to be. Actually Díez and Spearot (2014) argue that better matches increase the incentives to

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<sup>27</sup>The ownership share is not evoked, implicitly assuming a 50-50 equity ownership, as the equal profit sharing reveals.

<sup>28</sup>Another possibility consists in embodying the  $z$  parameter into  $\beta_h \equiv \alpha(S_i, I_i)$ , with similar results.

<sup>29</sup>Experience has both *competence building* and *partner selection* effect, as discussed in (Li and Meyer, 2009) . Therefore experience is closer here to the country-specific experience, rather than the general internationalization experience, or could be seen a mix from both. Indeed, contrary to our baseline model, we assume here experience to give information about the partner selection.

acquire the foreign partner, and could result in increased or full ownership.

## B Empirical Analysis Appendix

### B.1 Ownership thresholds and categories

The following histogram displays the concentration of joint-ventures over a few numbers of ownership shares. The horizontal dot line indicates the 5% of joint-venture cut-off. Such a concentration of ownership shares among indicates threshold effects when reaching a specific value.

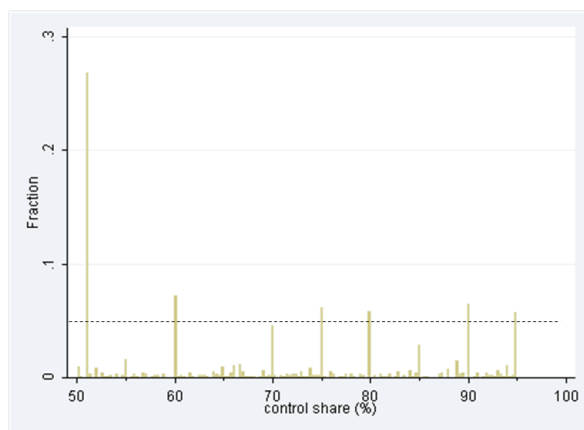


Figure 2: Distribution of ownership shares

### B.2 List of countries according to Rule of Law quality

For each year, we divided the sample of the 87 host countries into High Rule of Law (above median) and Low Rule of Law countries (below median). The two samples aren't of the same size because host countries with higher rule of law are more often chosen by French firms. Six countries appear in both groups because they switch from groups over the years, due to an index close to the sample median value : India, Slovakia, South Africa, Thailand, Tunisia and Turkey.

**Lower Rule of Law index :** Algeria; Angola; Argentina; Benin; Brazil; Bulgaria; Burkina Faso; Cambodia; Cameroon; Central African Republic; China; Colombia; Congo; Côte d'Ivoire; Croatia; Dominican Republic; Egypt; Gabon; Ghana; Guinea; Honduras; India; Indonesia; Iran; Kazakstan; Kenya; Lebanon; Madagascar; Mexico; Mongolia; Morocco; Niger; Nigeria; Panama; Peru; Philippines; Romania; Russian Federation; Senegal; Serbia; Slovakia; South Africa; Tanzania United Rep. of; Thailand; Togo; Tunisia; Turkey; Ukraine; Venezuela; Viet Nam

**Upper Rule of Law index :** Australia; Austria; Belgium; Canada; Chile; Costa Rica; Cyprus; Czech Republic; Denmark; Finland; Germany; Greece; Hong Kong (SARC); Hungary; India; Ireland; Israel; Italy; Japan; Korea; Luxembourg; Malaysia; Mauritius; Netherlands; New

Zealand; Norway; Poland; Portugal; Singapore; Slovakia; Slovenia; South Africa; Spain; Sweden; Switzerland; Taiwan; Thailand; Tunisia; Turkey; United Arab Emirates; United Kingdom; United States of America; Uruguay

### B.3 Alternative proxies for internationalization experience

Table 9: Ordered Logit (WOS)

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low RoL	World	World
$\log_2$ Nb. WOS (t-1)	1.330 (7.93)***	1.113 (2.99)***	1.121 (2.74)***	1.205 (3.30)***	1.193 (3.90)***	
$\log_2$ TFP (t-1)	1.062 (2.25)**	1.100 (1.94)*	1.099 (1.23)	1.039 (0.26)	1.052 (1.59)	
$\log_2$ Rule of Law (t-1)	1.386 (10.89)***	1.060 (0.37)	0.948 (0.24)	0.681 (1.62)	0.761 (0.67)	0.946 (0.33)
$\log_2$ RoL*Nb. WOS					0.940 (1.22)	
$\log_2$ RoL*TFP (t-1)					1.025 (1.09)	
$\log_2$ TFP(t-1)*High RoL						1.102 (2.00)**
$\log_2$ TFP(t-1)*Low RoL						1.059 (1.64)
$\log_2$ Nb. for. aff. (t-1)*High RoL						1.100 (2.24)**
$\log_2$ Nb. for. aff. (t-1)*Low RoL						1.183 (3.53)***
Pseudo R <sup>2</sup>	0.04	0.29	0.31	0.32	0.29	0.29
Nb. Obs	22,934	22,934	18,110	4,824	22,934	22,934
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

Table 10: Ordered Logit (Exports)

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low Rol	World	World
log <sub>2</sub> Exports (t-1)	1.035 (3.33)***	1.021 (2.03)**	1.026 (2.21)**	1.002 (0.10)	1.036 (1.54)	
log <sub>2</sub> TFP (t-1)	1.125 (3.31)**	1.227 (2.29)**	1.076 (0.69)	1.134 (0.79)	1.203 (2.03)**	
log <sub>2</sub> Rule of Law (t-1)	1.403 (10.89)***	1.055 (0.33)	0.936 (0.30)	0.646 (1.83)*	0.855 (0.41)	0.921 (0.48)
log <sub>2</sub> RoL*Exports					0.992 (0.36)	
log <sub>2</sub> RoL*TFP (t-1)					1.015 (0.74)	
log <sub>2</sub> TFP(t-1)*High RoL						1.223 (2.30)**
log <sub>2</sub> TFP(t-1)*Low RoL						1.189 (1.95)*
log <sub>2</sub> Exports(t-1)*High RoL						1.027 (1.71)*
log <sub>2</sub> Exports (t-1)*Low RoL						1.036 (1.50)
Pseudo R <sup>2</sup>	0.03	0.26	0.26	0.32	0.26	0.26
Nb. Obs		22,934	18,110	4,824	22,934	22,934
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

Table 11: Ordered Logit (Nb. countries)

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low Rol	World	World
log <sub>2</sub> Nb. countries (t-1)	1.301 (5.42)***	1.142 (2.68)***	1.121 (2.00)**	1.240 (2.64)***	1.235 (3.27)***	
log <sub>2</sub> TFP (t-1)	1. (2.50)**	1.325 (2.15)**	1.110 (0.67)	1.104 (0.44)	1.228 (1.72)*	
log <sub>2</sub> Rule of Law (t-1)	1.660 (11.22)**	1.082 (0.34)	0.913 (0.29)	0.549 (1.72)*	0.743 (0.58)	0.943 (0.24)
log <sub>2</sub> RoL*Nb. countries.					0.908 (2.00)**	
log <sub>2</sub> RoL*TFP (t-1)					1.052 (1.25)	
log <sub>2</sub> TFP(t-1)*High RoL						1.313 (2.21)**
log <sub>2</sub> TFP(t-1)*Low RoL						1.259 (1.83)**
log <sub>2</sub> Nb. countries (t-1)*High RoL						1.106 (1.87)**
log <sub>2</sub> Nb. countries (t-1)*Low RoL						1.229 (2.90)***
Pseudo R <sup>2</sup>	0.03	0.26	0.28	0.32	0.22	0.26
Nb. Obs		22,934	18,110	4,824	22,934	22,934
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.



## B.4 Alternative intervals for ordered logit

To make sure the results are not driven by the ownership threshold we drawn from actual ownership shares concentration, we replace them by the six following ordinal ownership classes: [50;60[ [60;70[ [70;80[ [80;90[ [90;100[ [100]. This classification implies that ownership threshold correspond to round values around tenth of ownership. Although this is often true, this classification doesn't distinguishes for frequent ownership thresholds that are 2/3 and 3/4 of ownership share. However this classification doesn't suffer from the suspicion to be intentionally drawn for the results to emerge, yet the results are quite similar to table 8. Actually the sub-sample analysis with these categories supports our prediction better than the specification in table 8. Our three theoretical predictions are comforted, with both experience and productivity having a positive and significant effect on the ownership class reached, with a notable higher effect of experience in low rule of law countries, when the reverse is observed for total factor productivity.

Table 12: Ordered Logit (Alternative ownership thresholds)

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low Rol	World	World
$\log_2$ Nb. for. aff. (t-1)	1.113 (3.14)***	1.086 (2.20)**	1.098 (1.88)*	1.130 (2.62)***	1.139 (2.63)***	
$\log_2$ TFP (t-1)	1.150 (3.86)***	1.503 (4.29)***	1.463 (3.67)***	1.530 (1.95)*	1.444 (3.48)***	
$\log_2$ Rule of Law (t-1)	1.655 (12.35)***	0.988 (0.07)	0.622 (2.05)**	0.591 (2.00)**	0.684 (0.76)	0.922 (0.41)
$\log_2$ RoL*Nb. for. aff.					0.938 (1.47)	
$\log_2$ RoL*TFP (t-1)					1.045 (1.05)	
$\log_2$ TFP(t-1)*High RoL.						1.499 (4.31)***
$\log_2$ TFP(t-1)*Low RoL.						1.460 (3.93)***
$\log_2$ Nb. for. aff. (t-1)*High RoL.						1.063 (1.50)
$\log_2$ Nb. for. aff. (t-1)*Low RoL.						1.147 (2.72)***
Pseudo R <sup>2</sup>	0.03	0.24	0.26	0.28	0.24	0.24
Nb. Obs	22,934	22,934	18,110	4,824	22,934	22,934
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

## B.5 Alternative proxy of contract incompleteness

Aside from using the Rule of Law index to measure the host country institutional quality and therefore the contractual incompleteness; we used an alternative proxy: the average survival rate of French affiliates. Similar index based on exporter's survival rate has already been used to capture the uncertainty domestic firms face abroad – the more uncertainty, the more the proportion of firm that wouldn't actually be adapted for that market, leading to higher exit

rate – (Conconi et al., 2016). However, contrary to Conconi et al. (2016), we do not assume this uncertainty to be in terms of actual demand, but rather of of actual formal and informal environment, which determines the completeness of contracts the MNE could offer to the foreign partner in the first period of our model. More specifically, if the MNE doesn't know all subtleties of local laws or habits, she would let room for the foreign partner to increase its range of non enforceable activities, which would virtually correspond to lower institutional quality. Including a foreign-demand uncertainty in the model would be a straightforward extension, following the baseline of Conconi et al. (2016).

The rest of the model suits also well with this interpretation, assuming notably that previous international experience reduces this type of uncertainty, and would therefore be particularly required to invest in countries with high uncertainty.

Yet, the econometric results displayed in table 13 are less conclusive than our main estimation model. While the overall test of propositions 1 and 2 still hold in columns (1) and (2), and the sub-sample analysis being as inconclusive on proposition 3 than the main analysis reported in table 8. However, we fail in verifying the third proposition in the last column (6). Specifically, while the higher importance of experience in low survival countries is verified in the interaction terms, the TFP seems to play a very similar role in both types of countries, contrary to our assumption.

Table 13: OLS (Survival Rate)

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low Rol	World	World
ln Nb. for. aff. (t-1)	0.005 (2.57)***	0.005 (2.12)*	0.003 (0.81)	0.007 (2.64)***	0.007 (1.03)	
ln TFP (t-1)	0.022 (7.56)***	0.012 (2.47)**	0.010 (1.06)	0.014 (2.55)**	0.021 (2.76)***	
Survival rate (t-1)	-0.184 (13.13)***	1.162 (6.32)***	1.087 (3.19)***	2.938 (4.40)***	1.379 (6.27)***	1.221 (6.20)***
Survival*Nb. for. aff.					-0.05 (0.41)	
Survival*TFP (t-1)					-0.016 (1.49)	
ln TFP(t-1)*High Surv.						0.012 (2.41)**
ln TFP(t-1)*Low Surv.						0.013 (2.51)**
ln Nb. for. aff. (t-1)*High Surv.						0.004 (1.39)
ln Nb. for. aff. (t-1)*Low Surv.						0.005 (2.33)**
R <sup>2</sup> (overall)	0.03	0.05	0.04	0.06	0.05	0.05
Nb. Obs	22,568	22,568	8,651	13,917	22,568	22,568
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

This disappointing results on the role of TFP might have two sources, who could have

Table 14: Ordered Logit (Survival Rate)

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low RoL	World	World
ln Nb. for. aff. (t-1)	1.161 (3.12)***	1.079 (1.89)*	1.078 (1.49)	1.193 (2.89)***	1.226 (0.87)	
ln TFP (t-1)	1.125 (2.29)**	1.221 (1.61)	1.088 (0.55)	0.989 (0.05)	0.989 (0.06)	
Survival rate (t-1)	6.034 (4.66)***	0.296 (2.93)***	0.802 (0.42)	0.147 (2.60)***	0.004 (1.56)	0.313 (2.93)***
Survival*Nb. countries.					0.775 (0.55)	
Survival*TFP (t-1)					1.543 (1.27)	
ln TFP(t-1)*High Surv.						1.315 (2.09)**
ln TFP(t-1)*Low Surv.						1.314 (2.06)**
ln Nb. countries (t-1)*High Surv.						1.030 (0.45)
ln Nb. countries (t-1)*Low Surv.						1.151 (2.82)***
Pseudo R <sup>2</sup>	0.01	0.26	0.28	0.32	0.26	0.27
Nb. Obs	22,568	22,568	8,651	13,917	22,953	22,568
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.

undermined our estimation, which led us not to use this approach as the main estimation strategy, although only half of proposition 3 isn't verified. First, for this survival rate to be meaningful, it should have been calculated over a significant number of firms. We therefore had to reduce our sample, to remove countries with less than 10 new French affiliates since 1996 (our first year of observation). Though, this is an arbitrary threshold, which remains quite low for our sample not to be too restricted. Yet, the new sample lies on 1,404 MNEs (-6 compared to the initial sample), 6,186 affiliates (-132); and 60 host countries (-27 (!))<sup>30</sup>

The second limitation this approach suffers from would be that the exit rates (and survival rates), cannot be strictly compared across destinations. As the targeting MNEs vary across destinations we end up comparing exit rate of different populations. Notably, France's neighbouring countries display among the lower survival rate (0.45, against 0.55 in (unweighted) average for all countries). This is not because they are more uncertain destinations, but because they attracts smaller and "weaker" firms. Although exit rate might capture the ex-ante legal uncertainty faced by investing firms, it certainly also depends of other factors, notably endogenous ones. This leads to a negative correlation between Rule of Law index and Survival rate of -0.3181 -where one would expect it to be positive-. Another indicator that the exit rate is a poor index of uncertainty or institutional quality of host countries, would be that with this classification,

<sup>30</sup>Countries deleted from the sample were : Angola, Benin, Burkina Faso, Central African Republic, Congo, Costa Rica, Cyprus, Dominican Republic, Egypt, Ghana, Guinea, Honduras, Croatia, Iran, Israel, Kazakhstan, Kenya, Cambodia, Madagascar, Mongolia, Niger, Panama, Peru, Serbia, Togo, Tanzania and Ukraine.

we observe more affiliates in countries with low survival rates (3,797 affiliates and 1,121 parent firms); than in countries with high survival rate (2,444 affiliates for 831 parent firms). The logic (and previous research confirms it) would be that firms go more in countries with less uncertainty and better contracting institutions. This is what we find in our main analysis, where the upper half of rule of law countries gathered 5,064 affiliates and 1,304 parent firms, versus respectively 1,423 and 497 for low rule of law countries. The two samples being more equitable in the survival analysis, with lower variability within the overall country sample, but with very dissimilar countries in sub-samples, it could explain the similar role of TFP across host-countries survival rates.

## B.6 Alternative dependent variable

Because the mechanism we explain, and specially the gradual pattern, should only apply for foreign ownership, we decided to compare the domestic ownership of firms with their foreign ownership rate. To do so, we compute the annual mean ownership rate of domestic affiliates of French MNEs in our sample, and then for each foreign affiliate calculate the difference between foreign and domestic control. The difference is computed as *foreign – domestic* ownership share, for a higher result to indicate a higher foreign ownership share, to have results directly comparable with previous estimations.

A first result, coherent with our model is that domestic control is higher than foreign control overall. Yet the difference decreases with TFP as reports table 15, indicating a role of TFP in reaching foreign ownership levels close to domestic ones. Similar observation is done for experienced MNEs. Also, this difference increases in countries with low rule of law index.

sample	mean difference
overall	-2.74
1 <sup>st</sup> quintile TFP	-5.76
2 <sup>nd</sup> quintile TFP	-2.52
3 <sup>rd</sup> quintile TFP	-2.69
4 <sup>th</sup> quintile TFP	-2.74
5 <sup>th</sup> quintile TFP	-1.90
Low Rule of Law destination	-5.40
High Rule of Law destination	-1.93
1 <sup>st</sup> foreign affiliate	-4.16
2 <sup>nd</sup> or more	-2.71

Table 15: Foreign - Domestic ownership difference

Table 15 shows globally the same overall characteristics as the analysis of absolute foreign ownership.

The econometric analysis (16) supports this view, even controlling form firm-level and host country fixed-effects.

Table 16: Panel OLS - Foreign-Domestic ownership difference

	(1)	(2)	(3)	(4)	(5)	(6)
	World	World	High RoL	Low Rol	World	World
ln Nb. for. aff. (t-1)	0.005 (1.89)*	0.006 (2.02)**	0.006 (1.89)*	0.011 (1.80)*	0.012 (3.91)***	
ln TFP (t-1)	0.013 (3.06)***	0.014 (2.14)**	0.012 (1.81)*	0.011 (0.59)	0.010 (1.50)	
Rule of Law (t-1)	0.021 (14.25)***	0.009 (1.39)	-0.031 (2.02)**	-0.016 (0.60)	-0.015 (1.05)	0.003 (0.39)
RoL*Nb. for. aff.					-0.007 (4.71)***	
RoL*TFP (t-1)					0.004 (3.00)***	
ln TFP(t-1)*High RoL.						0.013 (2.05)**
ln TFP(t-1)*Low RoL.						0.010 (1.59)
ln Nb. countries (t-1)*High RoL.						0.04 (1.31)
ln Nb. countries (t-1)*Low RoL.						0.013 (3.67)***
R <sup>2</sup> overall	0.01	0.05	0.03	0.08	0.05	0.05
Nb. Obs						
Firm-level Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes

Odd ratios reported in first row

t-stats are in parenthesis

\*\*\*, \*\* and \* respectively significant at 1%, 5% and 10%.