Core Competencies, Matching, and the Structure of Foreign Direct Investment*

Federico J. Díez
Federal Reserve Bank of Boston

Alan C. Spearot
University of California, Santa Cruz

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Abstract

We develop a matching model of foreign direct investment to study how multinational firms choose between greenfield investment, acquisitions, and joint ownership. Firms must invest in a continuum of tasks to bring a product to market. Each firm possesses a core competency in the task space, but the firms are otherwise identical. For acquisitions and joint ownership, a multinational enterprise (MNE) must match with a local partner that may provide complementary expertise within the task space. However, under joint ownership, investment in tasks is shared by multiple owners and hence is subject to a holdup problem that varies with contract intensity. In equilibrium, ex ante identical multinationals enter the local matching market, and ex post, three different types of heterogeneous firms arise. Specifically, the worst matches are forgone and the MNEs invest greenfield; the middle matches operate under joint ownership; and the best matches integrate via full acquisition. We link the firm-level model to cross-country and industry predictions, and find that a greater share of full acquisitions occur between more proximate markets, in hosts with greater revenue potential, and within contract-intensive industries. Using data on partial and full acquisitions across industries and countries, we find robust support for these predictions.

Keywords: foreign direct investment, multinational firms, joint ownership, merger and acquisition, greenfield investment, incomplete contracts

JEL Classification: F12, F23

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1 Introduction

As a result of the trade and financial liberalizations that have taken place over the last few decades, several new markets have been opened, providing new opportunities for large multinational enterprises (MNEs). Given the millions of potential new customers in these new markets, choosing the right mode of market entry is of paramount importance. Indeed, choosing the wrong entry mode can lead to poor outcomes, even for the "best" MNEs.[1]

What choices are available to a MNE preparing to enter a new market? At a general level, the MNE can work alone via greenfield investment, or it may instead choose to operate with a local partner. If it chooses the latter, the MNE has the option of working under a joint ownership structure, or purchasing the local partner outright. The costs and benefits of each option will likely vary with country and industry characteristics, complicating matters beyond the nontrivial number of entry choices. For example, consider a U.S. MNE entering a developing market. On one hand, there might be local partners with poor outside options that are relatively easy to purchase. On the other hand, distance between the investment source and host may complicate the integration of large affiliates in new markets. Further, industries in which contracts and bargaining are of high importance might require deeper relationships to avoid agency issues.

We develop a model of foreign direct investment (FDI) to study how industry and country characteristics affect the entry choices of multinationals, where MNEs choose whether to match with a local partner, and, if they do, whether to bring the match under full ownership. We view production as a set of tasks in which investment takes place, and each firm, local and MNE, is relatively efficient at certain tasks and inefficient at certain other tasks. The task that can be performed most efficiently is the firm's core competency. Entering the market for corporate control is a way to increase efficiency by finding a local parter with complementary assets. However, as each task requires investment, an ownership structure involving multiple independent parties may be complicated by agency issues in the investment process. Hence, we allow the MNE to choose the contractual arrangement that governs the new foreign affiliate. Depending on the quality of the match with the local partner—the degree of complementarity—the MNE may be compelled to complete the match through a full acquisition rather than to operate under joint ownership.

In equilibrium, ex ante identical firms enter the foreign matching market to find a local partner, and ex post, a heterogeneous group of firms arise that have sorted into three forms of ownership.[2]

[1]For example, Wal-Mart was not particularly successful when it entered Germany via full acquisition. Other famous examples include the brief experiences of Vodafone in Japan and of Home Depot in Chile.

[2]The endogenous heterogeneity resulting from ex ante identical firms is similar to Ederington and McCalman (2008), though in their case heterogeneity arises due to the timing of investments.

Specifically, we find that the least efficient of these matches are forgone, the mid-efficiency matches operate under joint ownership, and the most efficient matches involve full acquisition. The intuition for this sorting is straightforward. The least-efficient matches are forgone because the match does not offer joint profits sufficient to compensate the MNE and local firms for the opportunity cost of their outside option. For matches that reach a threshold level of efficiency gains, firms operate as a jointly owned enterprise, or if superior in efficiency, via full acquisition. Intuitively, the incomplete contracts associated with joint ownership cause a holdup problem in coordinating investments in the final product. When match potential is high, the loss of profits due to holdup is quite severe, and the MNE instead chooses to buy out the local firm, pay a fixed integration cost, and bring all investment responsibilities under one owner.

We derive a number of predictions that relate the depth of acquisitions to industry, country-pair, and host characteristics to motivate an empirical test of the model. First, industries with a greater contract intensity experience a larger share of transactions that are full acquisitions. Intuitively, when very specific inputs require hard-to-verify contracts, holdup problems are more pronounced and MNEs are more likely to avoid these issues by purchasing firms in full. Second, similar to Head and Ries (2008), we assume that integration and investment costs increase with distance and, under this parameterization, we show that a greater distance between the host and the source country pair decreases the share of acquisitions that are full acquisitions. Finally, we evaluate the role of revenue potential in the target market. When operating under joint ownership, revenue potential is degraded by a hold up problem. Hence, a host market with more revenue potential yields a greater share of full acquisitions, since this pushes up the profits of full acquisitions and greenfield investment relative to those of joint ownership.

In our empirical work, we use a large database of acquisitions by host-source-industry groups and find support for all of our predictions. For instance, using contract intensity data from Nunn (2007), we find that industries with a greater share of inputs requiring contracts involve a greater share of full acquisitions. Additionally, we find that a greater distance between the host and source country pair is associated with a lower share of full acquisitions. Finally, a host market with more revenue potential as measured by levels and growth rates of GDP and GDP per capita experiences a higher share of full acquisitions.[3]

This paper merges multiple strands of literature on topics relating to firm heterogeneity and FDI, the property rights theory of the firm, and firm-to-firm matching. On a very basic level, our paper is similar to the canonical literature on firm heterogeneity in Melitz (2003) and Helpman,

[3]This is consistent with empirical evidence in Desai et al. (2004) who find that almost 60 percent of U.S. affiliates in developing countries are partially owned, whereas this figure drops to 15.5 percent in the richest countries.

Melitz, and Yeaple (2004), where firms select into different options by balancing fixed costs against heterogeneous operating profits. However, our paper differs in that heterogeneity in operating profits is endogenous and a function of the quality of the local match and the organizational form that governs the match.

In terms of theoretical contributions, we integrate a circle-type matching framework similar to Rauch and Trindade (2003) and Grossman and Helpman (2005) with an investment model in the mold of Antràs and Helpman (2008). Specifically, the investment framework in Antràs and Helpman (2008), in which firms invest in a continuum of tasks and earn revenues in the context of a constant elasticity of substitution (CES) revenue function, provides the foundation on which to define tasks around a circle and add a simple matching framework. Together, we build a novel hybrid model in which the closed form solution for match efficiency is very simple and applicable to any CES-type model that requires a matching component. Further, relative to Rauch and Trindade (2003), we allow for a varying degree of common ownership within the match. As discussed above, we are able to distinguish empirically between joint ownership and full ownership as different forms of foreign investment, and use this distinction to motivate an empirical test of the model. Relative to Grossman and Helpman (2005), our contributions are complementary, in that we focus on the choice of foreign investment type rather than on the outsourcing vs. integration decision in developing a product. Further, we allow for greenfield investment when matches fail.

The results are also related to the literature that examines the optimal mode of foreign investment. As mentioned above, Head and Ries (2008) view FDI as a manifestation of the market for corporate control, and derive a gravity-like equation to explain the observed FDI inflows/outflows between country pairs. In our work, we focus on (among other things) the role of distance in affecting the *composition* of these transactions. Nocke and Yeaple (2007) examine the choice between greenfield FDI and mergers and acquisitions as a function of whether capabilities are transferrable across borders. Their work, which abstracts from contracts and joint ownership, shows that the optimal sorting of firms is critically dependent on the degree to which capabilities are internationally mobile. Raff, Ryan, and Stähler (2009) examine the three-way decision between joint ventures, acquisitions, and greenfield investment—but, in contrast to our work, within an oligopoly setting without matching—and find that the profits from greenfield investment are a crucial factor in the choice between mergers and acquisitions and joint ventures.[4] Finally, in recent work, Bircan (2011) examines the stability of partial ownership using a learning model of FDI and unique plant-level data from Turkey.[5] Our focus on contracts is similar, although our approach to evaluating cross-industry

[4]For other international merger models, see Horn and Persson (2001) and Norbäck and Persson (2004).

[5]Other papers focusing on the stability of joint ownership include Killing (1982), Gomes-Casseres (1987), Hamel

and cross-country patterns of investment is novel.

In terms of the empirical contributions, our paper is related to a burgeoning empirical literature that evaluates the incentives for acquisitions and other investment types. Given data constraints, where target and acquiring firm observables are rarely jointly reported, we use our firm-level model to motivate a country pair-industry analysis of the composition of acquisition types. Our empirical contributions are most closely related to Di Giovanni (2005), Head and Ries (2008), Hijzen, Görg, and Manchin (2008), and Raff, Ryan, and Stähler (2012) in terms of the focus on mergers and acquisitions as FDI, although differ on a number of important levels. Relative to the aggregate gravity perspective in Di Giovanni (2005) and Head and Ries (2008), we focus on the bilateral patterns of mergers and acquisitions at the industry level, and in particular, the depth of acquisitions as a function of country and industry level observables.[6] Hijzen, Görg, and Manchin (2008) adopts an industry-level refinement similar to our work, but does not evaluate the depth of acquisition activity. Raff, Ryan, and Stähler (2012) does evaluate different types of FDI originating from Japan, including joint ventures, but does not differentiate joint ownership arrangements that result from mergers and acquisitions. Indeed, joint ownership arrangements resulting from acquisitions comprise a significant share of observed mergers, and are the focus of our work. Finally, more tangential but still related work includes a large literature that examines the mechanisms behind mergers in terms of cherry-picking (Arnold and Javorcik (2005), Blonigen, Fontagné, Sly, and Toubal (2012)), matching (Nocke and Yeaple (2008)), reallocation following trade agreements (Breinlich (2008)), and demand elasticities (Spearot (2012)).

The rest of the paper is organized as follows. Section 2 presents the basic setup of the model and describes the different organizational choices available to the MNE. Section 3 characterizes the equilibrium of the model and presents the comparative-static results and testable implications of the theory. Section 4 describes the dataset and presents the econometric results. Finally, Section 5 concludes.

2 Basic Setup

The primary focus of the model is a MNE that is deciding how to enter a foreign market and, where applicable, how to organize with a local partner. The timing of the model is straightforward. An MNE enters a foreign market, and randomly meets with a potential local partner. When partners

et al (1989), Kogut (1989), Inkpen and Beamish (1997), Miller et al. (1997), Sinha (2001), Inkpen and Ross (2001), and Roy Chowdhury and Roy Chowdhury (2001).

[6]Portes and Rey (2005) also evaluates FDI using a gravity perspective.

meet, they learn about each firm's expertise and their degree of complementarity. Subsequently, the MNE chooses the entry mode, parties makes investments, and earn profits. We solve the model by backward induction.

For simplicity, we assume that the MNE has three possible ways to enter the foreign market directly: greenfield investment, operating under joint ownership with a local firm, and acquiring a local firm.[7] The key to the model is how a MNE may divide the tasks required for production with the local firm and how the choice of organizational form incentivizes investment in each task. Shortly, we detail further particulars about each entry type, although the crucial distinction for the model will be that joint ownership projects operate under a less "complete" contract than the other forms of direct investment. While there may be fixed cost savings from not fully integrating the local partner, there may also be inefficiencies due to a holdup problem. Later, we introduce geographic frictions in terms of the investment and integration costs associated with whole ownership. To begin with, however, we focus on a foreign multinational firm matching with a local partner in an arbitrary market, and the subsequent decision over organizational choice.

2.1 Production and Operating Profits

Production in the model is defined over a continuum of tasks in which firms must invest to execute production of a final product, similar to the approach taken by Antràs and Helpman (2008). Specifically, we assume that all firms producing for market j do so subject to the following CES-type revenue function:[8]

$$R_j = M_j Y_{i,j}^{\beta}, \qquad \beta \in (0,1). \tag{1}$$

In equation (1), M_j is a measure of market size in j, β is a revenue elasticity parameter which we assume is common across all j, and $Y_{i,j}$ is output by entity i to serve market j. While at this point we do not make a distinction about different markets that are served, we later add in geographic components between markets that yield a different investment composition due to distance and revenue potential in the target market. Hence, for the remainder of this section we suppress i's and j's for brevity.

As mentioned above, Y is a function of how the firm invests in a continuum of tasks. Specifically, we assume that Y is characterized by the following constant returns function over a continuum of

[7] A model with exports gives similar predictions to the current model of direct access in terms of the composition of corporate reallocations—full vs. partial acquisitions.

[8] In the Supplemental Appendix, we derive this revenue function from a CES utility framework, and also derive a variant that allows for firms to produce multiple brands (after an acquisition).

tasks, T:

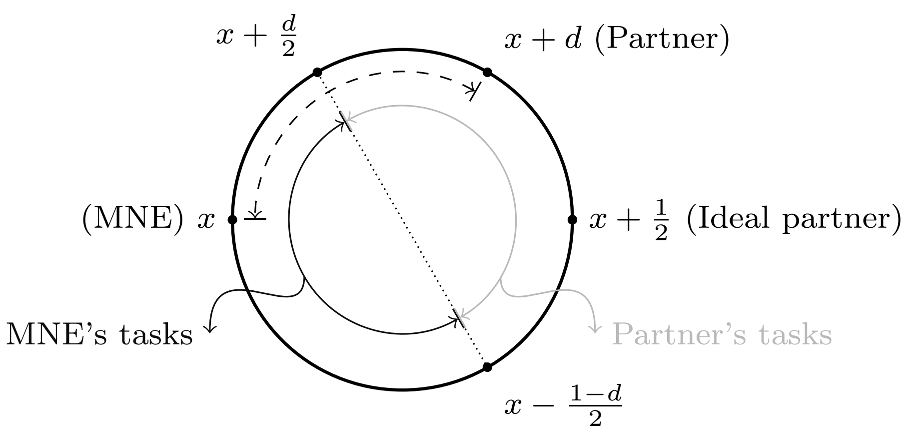
$$Y = \exp\left(\int_{t \in T} \log(y_t) dt \right), \tag{2}$$

where, y_t is investment in task t. We assume that tasks are uniformly distributed around a circle of circumference one, where every firm, whether local or multinational, has a unique position around the circle. This is the location of a firm's *core competency*, and tasks farther away from this location around the circle are more costly for the firm. A standalone firm cannot change its position around the circle to improve the efficiency of production. However, a firm may match with a partner in order to divide tasks in a way that minimizes costs, and, if it chooses to do so, may operate the combined firm under joint ownership or solo ownership via a full buyout.

Figure 1 provides a graphical representation of the division of tasks around the circle. The MNE is positioned at point x, making x its core competency. Ideally, the MNE would like to form a match with a partner located exactly halfway around the circle, at point $x + \frac{1}{2}$. Generally, since we assume that firms are randomly distributed around the circle, the partner will be located at a distance $d \in [0, \frac{1}{2}]$ from x. As we explain below, when the local firm is identical in terms of efficiency executing tasks around the circle, the MNE will take care of the tasks closest to x, and the partner undertaking those closest to $x + d$.[9]

We now consider production under all three cases of entry into the host country.

Figure 1: Allocation of Tasks Around the Circle



[9]An interesting venue for future research would be to have repeated or directed search instead of random matching.

Standalone Firms

In the model, there are two types of standalone firms: MNEs that invest greenfield and local firms that operate independently. As their operating profits will be identical, we begin by deriving these standalone profits. Later, we distinguish one kind of firm from another in terms of fixed costs.

Denote the cost of investing in each task t as c_t. The optimization problem of a standalone firm is the following:

$$\pi_S = \max_{y_t \forall t \in T} \left\{ M \left(\exp \left(\int_{t \in T} \log(y_t) dt \right) \right)^{\beta} - \int_{t \in T} c_t y_t dt \right\}.$$

Crucial to the optimization problem is the specification of costs of each task. As discussed above, tasks farther away from a firm's core competency x will be be more costly. To facilitate a closed form solution, we assume that a unit of investment in task t, which is at a point s_t (around the circumference of the circle in the closest direction) from the firm's core competency x, costs $c_t = e^{|s_t - x|}$ to complete. Hence, a unit of investment in the task precisely at x requires one unit of labor to complete, and the unit labor requirement rises with distance around the circumference of the circle from the firm's core competency. With this parameterization, and solving the stand-alone firm's investment problem, optimal investment in task t is written as:

$$y_t = \frac{\beta M Y^{\beta}}{e^{|s_t - x|}}.$$

Taking into account the uniform location of tasks around the unit circle, the equation for Y is written as

$$Y = \exp \left(\int_{x}^{x+1/2} \log \left(\frac{\beta M Y^{\beta}}{e^{s-x}} \right) ds + \int_{x-1/2}^{x} \log \left(\frac{\beta M Y^{\beta}}{e^{x-s}} \right) ds \right).$$

Simplifying, and plugging into optimal investment, operating profits are written as:

$$\begin{aligned} \pi_S &= (1-\beta)\beta^{\frac{\beta}{1-\beta}} M^{\frac{1}{1-\beta}} \exp \left(-\frac{\beta}{4(1-\beta)} \right) \\ &\equiv \pi_0. \end{aligned} \tag{3}$$

The operating profits of the standalone firms are labeled π_0. The operating profits of all other options will be derived relative to π_0.

Acquisition

The main difference between a greenfield investment and an acquisition is that in the latter case the MNE is matched with a local partner and purchases the capabilities of the local partner. Hence, the MNE decides which capabilities, MNE or local, are best suited to invest in each of the tasks required for production. The MNE then chooses the investment level in each task, using whichever capabilities are closest in the task space (the MNE's or the acquired firm's).

Since only one firm controls the investment levels in tasks, the optimal investment in task t as a function of c_t is the same as for the standalone firm. However, the marginal costs may differ because some of the tasks are being performed by capabilities acquired from the local partner. Within the circle context discussed above, the core competency of the matched local firm is at a distance $d \leq \frac{1}{2}$ away from the MNE. Hence, via cost minimization, the MNE, which is located at x, performs tasks between $\left(x - \frac{1-d}{2}\right)$ and $\left(x + \frac{d}{2}\right)$. The assets acquired from the local partner perform all other tasks. This is also depicted in Figure 1. With this parameterization, the equation for Y can be written as:

$$Y = \exp\left(2\int_{x}^{x+d/2} \log\left(\frac{\beta M Y^{\beta}}{e^{s-x}}\right) ds + 2\int_{x-\frac{1-d}{2}}^{x} \log\left(\frac{\beta M Y^{\beta}}{e^{x-s}}\right) ds\right).$$

Simplifying, this leads to operational profits of the merged firm, which can be written as:

$$\begin{aligned} \pi_A(d) &= (1-\beta)\beta^{\frac{\beta}{1-\beta}} M^{\frac{1}{1-\beta}} \exp\left(-\frac{\beta}{1-\beta}\left(\frac{d^2 - d + 1/2}{2}\right)\right) \\ &= \phi\left(d\right)\pi_0, \end{aligned} \tag{4}$$

where $\phi(d) \equiv \exp\left(\frac{\beta}{1-\beta}\frac{d(1-d)}{2}\right) \geq 1$, $\forall d \in \left[0, \frac{1}{2}\right]$.

We think of $\phi\left(d\right)$ as a measure of the quality of the match between the MNE and the domestic firm: $\phi\left(d\right)$ measures the improvement from splitting tasks with a partner (as opposed of being in charge of all tasks). Since $\phi\left(d\right) \geq 1$, an acquisition (weakly) increases the efficiency of production relative to a standalone firm. Additionally, since ϕ is increasing in d for $d \in [0, \frac{1}{2})$, this implies that better matches (that is, matches where the partners are farther away and are better complements) enjoy higher profits.

Joint Ownership

Having detailed the (polar) options of establishing a wholly owned subsidiary in the local market via greenfield investment and via acquisitions, we now turn to the option of joint ownership. Under this mode of FDI, the MNE forms a match with a local partner, but without buying out the local firm's capabilities. This option may provide advantages in terms of the costs of market entry—no new facilities are built, and there is no cost of fully integrating the local firm. However, because there are two owners jointly investing in the combined product, agency issues may arise when contracts are incomplete. Indeed, we adopt the assumption that contracts are at least partially incomplete under joint ownership and focus on these issues next.

We assume a flexible framework of partial contractibility, where we allow the degree of contractual incompleteness to vary across industries. Indeed, the severity of contractual issues for industries that must deal with highly sophisticated, customized tasks (hard to verify for a third party) is different than for industries contracting over something homogeneous (like how much light-sweet crude to buy). Thus, having a varying degree of contractual intensity will be helpful for guiding the empirical work.

To add in contractual incompleteness, suppose that task y_t is made of a contractible component and a component subject to incomplete contracts. Specifically, assume that the composite task is split into the two types of tasks as follows:

$$y_t = \left(\frac{y_t^I}{\gamma}\right)^{\gamma} \left(\frac{y_t^c}{1-\gamma}\right)^{1-\gamma}. \tag{5}$$

In equation (5), y_t^I represents investment in tasks subject to incomplete contracts, and y_t^c is investment in tasks subject to complete contracts. The term $\gamma \in (0,1)$ represents the relative weight on tasks subject to incomplete contracts.

Next, we need to specify how the investment levels for contractible and non-contractible tasks are determined. For tasks subject to complete contracts, we assume that the investment levels will be as if both parties agreed to maximize the joint production of the relationship. That is, each party is contractually obligated to invest such that the joint product is maximized, where these investments are verifiable to an outside party. In this case, the maximization problem and the resulting investment level for either party are given by:

$$\max_{y_t^c \forall t \in T} \left\{ M \left(\exp \left(\int_{t\in T} \log \left[\left(\frac{y_t^I}{\gamma}\right)^{\gamma} \left(\frac{y_t^c}{1-\gamma}\right)^{1-\gamma} \right] dt \right) \right)^{\beta} - \int_{t\in T} c_t \left(y_t^I + y_t^c\right) dt \right\}$$

$$y_t^c = \frac{(1-\gamma)\,\beta M Y^{\beta}}{c_t}. \tag{6}$$

For tasks subject to incomplete contracts, each party is contractually obligated to invest such that joint product is maximized, but these investments are not verifiable to a third party. Hence, we assume parties invest to maximize their own share of profits, which we assume to be one half of the total revenue earned from the joint investment.[10] Under this assumption, investments in non-contractible tasks (y_t^I) by the MNE are defined by the following maximization problem:

$$\max_{y_t^I \forall t \in T_{MNE}} \left\{ \frac{M}{2} \left(\exp \left(\int_{t \in T_{MNE}} \log \left[\left(\frac{y_t^I}{\gamma} \right)^{\gamma} \left(\frac{y_t^c}{1-\gamma} \right)^{1-\gamma} \right] dt + \int_{t \in T_P} \log(y_t) dt \right) \right)^{\beta} \right.$$
$$\left. - \int_{t \in T_{MNE}} c_t \left(y_t^I + y_t^c \right) dt \right\},$$

where T_{MNE} is the set of (composite) tasks that are performed by the MNE within the total set of tasks T. The maximization problem of the local partner is identical to that of the MNE, shown above, with the exception that T_P, the set of tasks undertaken by the local firm, and T_{MNE} are switched. Note that while the parties agree to share the revenue generated by the jointly owned entity, the revenue itself depends on the investments undertaken by both parties. Given the incomplete contract environment, the parties cannot commit to an investment level (the maximization takes the contractible tasks y_t^c and the other party's tasks as given) despite the fact that each party must incur the full costs of the tasks for which it has responsibility.

Differentiating with respect to y_t^I yields the following for all t:

$$y_t^I = \frac{\gamma \beta \frac{M}{2} Y^{\beta}}{c_t}. \tag{7}$$

Hence, conditional on Y (which will be endogenous) investment levels in each non-contractible task are exactly one half of what they would be under complete contracts. Plugging the investment levels, contractible and non-contractible, into the equation for Y, the MNE's operating profits under joint ownership are written as:

$$\widetilde{\pi}_J(d) = \left[1 - \beta \left(1 - \gamma + \frac{\gamma}{2} \right) \right] \left(\frac{1}{2} \right)^{\frac{1-\beta+\beta\gamma}{1-\beta}} \beta^{\frac{\beta}{1-\beta}} M^{\frac{1}{1-\beta}} \exp \left(-\frac{\beta}{1-\beta} \frac{d^2 - d + 1/2}{2} \right). \tag{8}$$

We assume that the MNE and the local firm, if they choose joint ownership, can engage in side payments, so the primary measure relevant for organizational choice is total operating profits earned under the new firm. These total operating profits under joint ownership can be written as

[10] The model can be easily extended to shares not equal to 1/2

follows:

$$\pi_J(\gamma, d) = \lambda(\gamma)\phi(d)\pi_0, \tag{9}$$

where $\lambda(\gamma) \equiv \frac{1-\beta\left(\frac{2-\gamma}{2}\right)}{1-\beta}\left(\frac{1}{2}\right)^{\frac{\beta}{1-\beta}\gamma} \in [0,1]$.

As with acquisitions, the MNE benefits from matching with a partner that is more efficient at some tasks—there is an efficiency gain through $\phi(d)$. However, there is also a potential efficiency loss due to a loose contractual relationship, which is measured by the term $\lambda(\gamma)$. Lemma 1 details precisely the properties of λ, and in particular, how λ changes with γ.

Lemma 1 *For $\beta \in (0,1)$, $\lim_{\gamma\to 0}\lambda(\gamma) = 1$, and $\frac{\partial\lambda}{\partial\gamma} < 0$.*

Proof. See Appendix ■

In Lemma 1, the inefficiency related to holdup is nil when there are no tasks subject to incomplete contracts ($\gamma \to 0$), and more pronounced with higher γ ($\frac{\partial\lambda}{\partial\gamma} < 0$). Intuitively, the greater the share of each task that involves unverifiable contracts, the larger is the degree to which holdup reduces profits under joint ownership.

Crucially, as detailed in equation (9), the degree to which inefficiency related to holdup reduces profits is, in absolute terms, a function of the quality of the match, $\phi(d)$. Specifically, the profit loss from holdup $(1 - \lambda(\gamma))$ is larger in absolute terms when the match quality $\phi(d)$ is higher. Lemma 2 provides two useful benchmarks:

Lemma 2 *For $d \in [0, 1/2]$ and $\beta \in (0,1)$, $\lim_{\gamma\to 1}\lambda(\gamma)\phi(d) < 1$ and $\lim_{\gamma\to 0}\lambda(\gamma)\phi(d) = \phi(d)$.*

Proof. See Appendix ■

Via Lemma 2, whenever $\gamma \to 1$, it is always the case that $\lambda\phi(d) < 1$, which implies that the inefficiency associated with holdup *always* degrades the match to the point of being less profitable (on an operational basis) than a standalone firm. In contrast, whenever $\gamma \to 0$ and all tasks are contractible, there is no efficiency loss due to holdup, and hence, operational profits under joint ownership are identical to operational profits of acquisitions.

2.2 Fixed Costs and Total Profits

The previous subsection characterized the operational profits for each organizational form as a function of match quality. Now, in order to characterize total profits, we introduce the fixed costs that must be paid to complete each type of investment.

Recall that in terms of operating profits, standalone firms earn π_0. If this standalone firm is a foreign multinational that invested greenfield, it must pay a fixed setup cost equal to F_G. Hence, total profits under greenfield investment are written as:

$$\Pi_G = \pi_0 - F_G. \tag{10}$$

In the equilibrium that follows, we view Π_G as the outside option of the MNE. Given that Π_G is a function of exogenous parameters, unrelated to contracts and matching, we assume that $\Pi_G > 0$, thus guaranteeing entry of the MNE into the new market. However, we will allow for F_G to vary with distance, where more distant markets incur larger setup costs.

Moving on to the local firm in the host country, we assume that the local firm differs from the MNE in that, as an established firm in the local market, there are no fixed costs incurred. Hence, total profits of the local firm are written as:

$$\Pi_L = \pi_0. \tag{11}$$

For acquisitions, the MNE must pay an integration cost associated with an acquisition, which is defined as F_A. Hence, total profits of the acquisition are written as:

$$\Pi_A(d) = \phi(d)\pi_0 - F_A. \tag{12}$$

Finally, we assume that under joint ownership, being a loose organizational form, incur no integration or setup costs. Hence, total profits are written as:

$$\Pi_J(d) = \phi(d)\lambda(\gamma)\pi_0. \tag{13}$$

To build intuition regarding the equilibrium of the model as it relates to match quality, it is straightforward to show that:

$$\frac{\partial \Pi_G}{\partial \phi(d)} = 0 \quad , \quad \frac{\partial \Pi_J}{\partial \phi(d)} = \lambda(\gamma)\pi_0 \quad , \quad \frac{\partial \Pi_A}{\partial \phi(d)} = \pi_0.$$

Obviously, greenfield investment is not affected by the quality of a match, simply because no match has occurred. However, for joint ownership and acquisitions, the effect of match quality is an increasing and monotonic function of $\phi(d)$, where via Lemma 2, we have shown that $\frac{\partial \Pi_J}{\partial \phi(d)} < \frac{\partial \Pi_A}{\partial \phi(d)}$ whenever $\gamma > 0$, which we assume for the remainder of the paper. It is then clear that the critical issue in pinning down the sorting of entry choices as a function of match quality is the relative ranking of fixed costs.

2.3 Match-Quality Cutoffs

Before characterizing the equilibrium, it is useful to introduce some structure to help the derivation. In particular, from the margins between the different organizational choices, we can derive two match-quality cutoffs that will guide our analysis.

First, consider the choice between joint ownership and declining the match. The MNE can compensate the local firm for its outside option (standalone operation) and also make additional profit for itself, if $\Pi_J(d) \geq \Pi_G + \Pi_L$. As a function of model parameters, this condition is written as:

$$\phi(d) \geq \frac{2\pi_0 - F_G}{\lambda\pi_0} \equiv \phi_J. \tag{14}$$

In equation (14), only matches of relatively high quality form under joint ownership rather than declining the match and operating as standalone entities. Note that a higher π_0 increases the value of the cutoff ϕ_J: a higher outside option for the domestic firm makes joint ownership less desirable for the MNE vis à vis greenfield investment. In contrast, a higher value of λ decreases the cutoff ϕ_J: more complete contract environments increase the relative profitability of joint ownership.

Consider next the choice between the acquisition of a local firm by the MNE and operating under joint ownership. An acquisition is preferred if the profits earned are larger than the combined profits of the MNE and the local firm under joint ownership; $\Pi_A(d) \geq \Pi_J(d)$. Precisely,

$$\phi(d) \geq \frac{F_A}{(1-\lambda)\,\pi_0} \equiv \phi_A. \tag{15}$$

In equation (15), a matched party prefers an acquisition to joint ownership when the match is of relatively high quality. In this case, the additional rents earned from the match are sufficient to overcome the fixed costs of integrating the local firm into the MNE. Note that the cutoff ϕ_A increases with λ, as better contracting settings increase the range of match quality for which operating under joint ownership is preferred to an acquisition. In contrast, ϕ_A decreases with π_0, since a reduction in profits due to the holdup problem is more pronounced when market potential is higher. Consider also the polar case in which the fixed costs of integration are equal to zero. In this case, all matches that provide a nonzero benefit of specialization take the form of acquisitions, since there are no additional fixed costs, and an acquisition provides the benefits of a match without the agency issues of two parties splitting revenues but making independent investments.

2.4 Equilibrium Sorting of Matches

In this subsection, we characterize the optimal organizational choice as a function of the quality of the matches and prove that there exists a parameter space such that all three types of FDI occur in equilibrium, after ex ante identical firms enter the matching market for corporate control. We also discuss the cases in which one or more options does not occur.[11]

We begin by deriving the conditions for our a baseline equilibrium, where all three types of investment occur. Given that $0 = \frac{\partial \Pi_G}{\partial \phi(d)} < \frac{\partial \Pi_{JV}}{\partial \phi(d)} < \frac{\partial \Pi_A}{\partial \phi(d)}$, this only occurs when the least efficient matches are declined, mid-efficiency matches involve joint ownership, and the most efficient matches result in acquisitions. Specifically, this outcome occurs if the following condition holds:

$$1 < \phi_J < \phi_A < \widehat{\phi},$$

where $\widehat{\phi} \equiv \phi|_{d=1/2}$ is the maximum possible benefit from a match.

Figure 2 provides a graphical representation of the baseline equilibrium. We see that the marginal value of a high-quality match is higher for acquisitions than for joint ownership. This is due to the holdup problem that is present under joint ownership, and is key to understanding the equilibrium sorting of matches into entry modes. Specifically, the forgone profits due to the holdup problem are largest when the potential profits of the match are large. Hence, the MNE is willing to pay a fixed cost to solve the holdup problem and integrate the local firm into one entity that controls investment in all tasks.

Next, we derive the precise conditions on fixed costs such that this baseline equilibrium occurs, and discuss when it does not occur. To begin with, consider the condition $1 < \phi_J < \widehat{\phi}$. As a function of model parameters, this condition can be written as follows:

$$\left(2 - \lambda\widehat{\phi}\right)\pi_0 \quad < \quad F_G < (2 - \lambda)\,\pi_0. \tag{16}$$

The intuition for this condition is the following. Recall that ϕ_J is the threshold level of match

[11] Alternatively, one could think of the MNE as first making the organizational choice based on the expected match quality, and adjusting after the actual match is observed. In an extension to the present model (available upon request), we find that this alternative generates three possible equilibria. First, if the expected match quality is sufficiently low, only greenfield investment occurs. Second, only acquisitions occur if the expected match quality is sufficiently high. Moreover, given that fixed costs of integration are sunk, acquisitions are never dissolved. Finally, only joint ventures occur if the expected quality is intermediate. But once the uncertainty is revealed, matches are dissolved/deepened just as outlined in this section. However, in our data we find that it is extremely rare to have acquisitions that are deepened from partial to full over long periods of time. This finding, in turn, could be indicating that firms do have information about (some) observables when matches are presented to them—so their decisions are not taken (only) on expected match quality.

quality such that MNEs are indifferent between greenfield investment and joint ownership. First, consider when F_G is below the left-hand-side of inequality (16), which is when greenfield investment is relatively cheap. This describes a situation in which $\phi_J > \widehat{\phi}$ and there exists no level of feasible match quality such that joint ownership is preferred to greenfield investment. In contrast, when F_G is above the right-hand-side of inequality (16), joint ownership subject to any match quality is preferred to paying the relatively high costs of greenfield investment

Next, consider $\phi_J < \phi_A < \widehat{\phi}$, which describes the case in which both joint ownership and acquisitions are supported within the feasible region of match quality. As a function of model parameters, this condition can be written as:

$$\frac{1-\lambda}{\lambda}(2\pi_0 - F_G) < F_A < \frac{1-\lambda}{\lambda}\lambda\widehat{\phi}\pi_0. \tag{17}$$

When F_A is above the right-hand-side of inequality (17), the benefit of "solving" the holdup problem is never larger than the fixed cost required to do so. Hence, acquisitions never occur when the fixed costs of integration are too high. In contrast, when F_A is below the left-hand-side of inequality (17), then for all matches such that joint ownership is preferred to greenfield investment, acquisitions are preferred to joint ownership (and the latter never occurs). Similarly, when F_G is relatively low, there is an increase of the match quality required to prefer joint ownership over greenfield investment. However, this raises the left-hand-side of inequality (17), and increases the likelihood that this is also the region where acquisitions are always preferred over joint ownership. Therefore, if either fixed cost is sufficiently low, joint ownership does not occur.

The relationship between fixed costs and are baseline equilibrium are summarized in the following Proposition.

Proposition 1 *Suppose that F_G and F_A satisfy (16) and (17). Then, for $\phi \in (1, \phi_J)$, matches are immediately declined (and firms operate independently); for $\phi \in (\phi_J, \phi_A)$, matches are kept and operate under joint ownership; and for $\phi \in (\phi_A, \widehat{\phi})$, matches integrate via acquisitions.*

The dark shaded area in Figure 3 represents all possible combinations of fixed costs F_G and F_A such that the equilibrium is the one described in Figure 2. Further, Figure 3 details the equilibrium outcomes in the other regions such that at least one of the investment options is not observed.[12] Consistent with the discussion of conditions (16) and (17), high values of F_G lead to the case in which only joint ownership and acquisitions occur. Likewise, when F_A is relatively high, then acquisitions do not occur.

[12]The precise indifference conditions are outlined in the Appendix.

Figure 2: Profits as a Function of Match Quality, ϕ

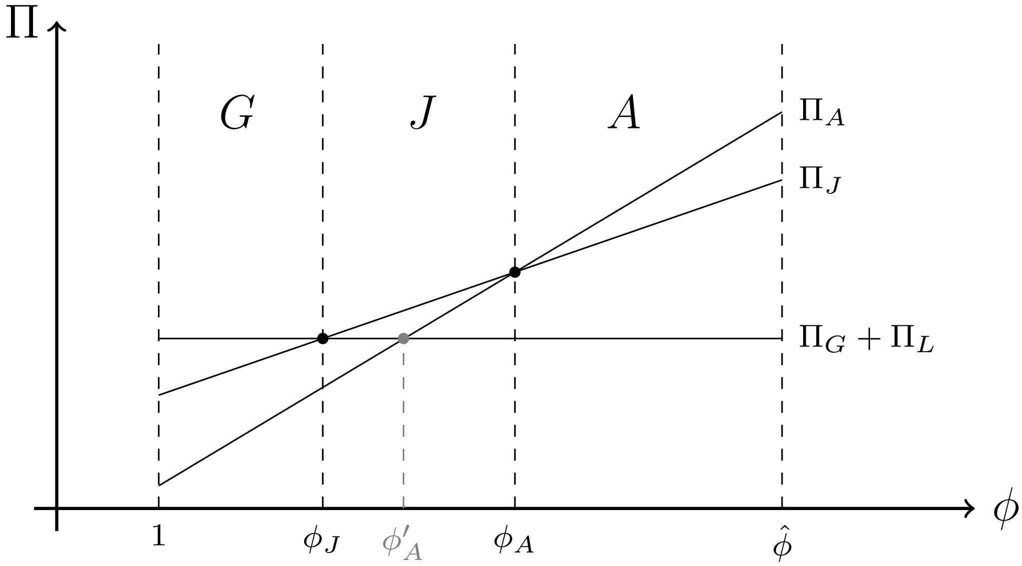
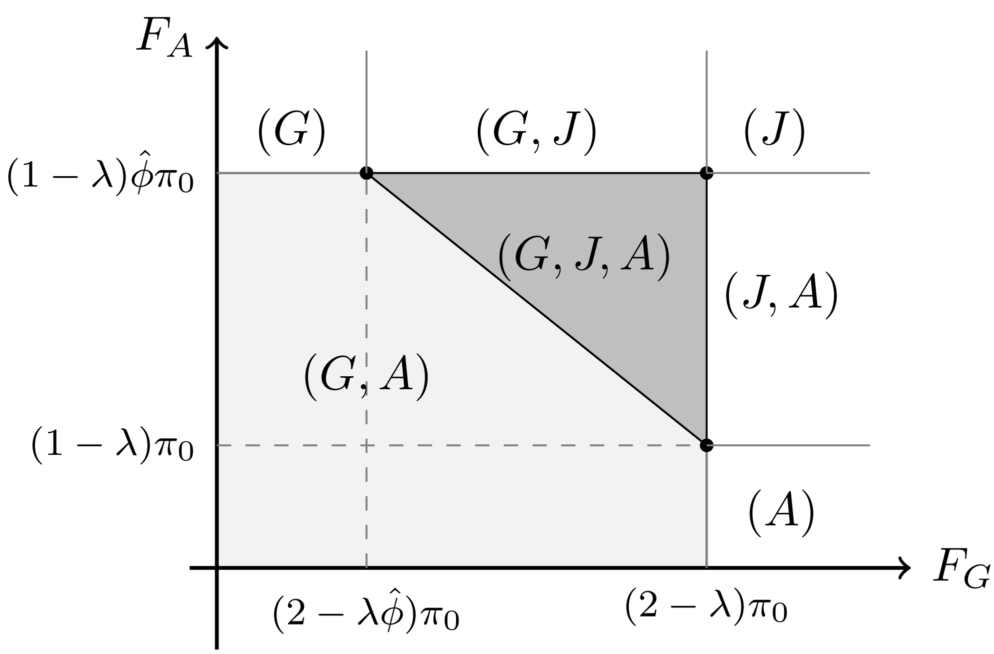


Figure 3: Equilibria as a Function of F_G and F_A



3 Distance, Market Potential, and the Composition of Investment

The equilibrium above details the average investment behavior of a given group of multinationals entering an arbitrary foreign market deciding whether to proceed with a match and, if so, whether that match is loose or deep. However, the relative attractiveness of each option may change with the contracting environment within an industry, with the revenue potential in the host market, and with the relative fixed costs of each investment option. In this section, we spell out precisely these latter issues by adding country-specific components into the model, and by relating the fixed costs of different options to country-pair differences such as geographical proximity. In doing so, we derive a concise set of empirical results to be tested in the next section.

To put more structure on the geographic and country-specific dimensions of the model, suppose that a firm from country k randomly matches with a firm in country j for the purpose of serving country j. Note that j might equal k, in which case the merger (full or partial) is purely domestic. We model the distinction between the source-of-investment nation and the host nation in terms of the fixed costs of standalone operation (F_G) and integration (F_A). Similar to Head and Ries (2008), we assume that both fixed costs are positively related to the geographic distance between the source and target nations. This is meant to reflect the increased organizational and monitoring costs associated with operating a wholly-owned affiliate in a distant location. Precisely, we adopt the following functional form for the fixed costs:

$$F_G^{k,j} = \psi_G \cdot d_{k,j}, \tag{18}$$

$$F_A^{k,j} = \tilde{F}_A + \psi_A \cdot d_{k,j}. \tag{19}$$

Consider first the fixed costs of standalone operation, $F_G^{k,j}$, where $d_{k,j}$ is the geographic distance between the source k and the host j, and ψ_G is the marginal effect of distance on fixed costs. Note that when distance is zero, there is no additional fixed cost since they are already an operable firm in that location (which matches our working assumption that local firms pay no fixed costs to operate). However, as distance increases, the fixed costs of standalone operation increase, which represents logistical or monitoring costs, distribution investment, or investments in new facilities. Next, consider the cost of integrating a local firm in market j by a firm from market k, $F_A^{k,j}$. Here, the fixed costs have similar properties in that bilateral geographic distance increases these costs, which represent increased monitoring expenditures, or other costs associated with a distant integration of an affiliate. The marginal effect of distance is modeled by the parameter ψ_A. However, when distance is zero, fixed costs are nonzero, which represents the fact that an integration of any firm, domestic or foreign, will incur additional fixed costs above and beyond that of loose contracts and joint ownership (à la Williamson, 1973).

With this setup, we can re-write the equilibrium cutoffs as follows:

$$\phi_J^{k,j} = \frac{2\pi_0^j - \psi_G \cdot d_{k,j}}{\lambda \pi_0^j}, \tag{20}$$

$$\phi_A^{k,j} = \frac{\tilde{F}_A + \psi_A d_{k,j}}{(1-\lambda)\,\pi_0^j}, \tag{21}$$

where π_0^j, equation (3) evaluated at M_j, is a measure of the target nation's market size/potential.

Using these refined cutoff definitions, we can now evaluate the effects of target nation characteristics, distance between host and source nations, and industry's contract completeness on each cutoff. Lemma 3 details these effects.

Lemma 3 *The effects of π_0^j, $d_{k,j}$, and λ on the cutoffs $\phi_J^{k,j}$ and $\phi_A^{k,j}$ are as follows:*

i. $\dfrac{\partial \phi_J^{k,j}}{\partial \pi_0^j} > 0, \qquad \dfrac{\partial \phi_A^{k,j}}{\partial \pi_0^j} < 0.$

ii. $\dfrac{\partial \phi_J^{k,j}}{\partial \lambda} < 0, \qquad \dfrac{\partial \phi_A^{k,j}}{\partial \lambda} > 0.$

iii. $\dfrac{\partial \phi_J^{k,j}}{\partial d_{k,j}} < 0, \qquad \dfrac{\partial \phi_A^{k,j}}{\partial d_{k,j}} > 0.$

Proof. See Appendix. ■

The first set of results in Lemma 3 summarizes the effect of π_0^j, that is, the level of market potential in country j. We find that higher values of π_0^j increase the cutoff $\phi_J^{k,j}$ and decrease the cutoff $\phi_A^{k,j}$. The intuition for the former is that higher market potential in the target reduces the relative size of the fixed cost of greenfield investment, and increases the outside option of the local firm to operate independently. Hence, greenfield investment is relatively more profitable. For the latter, as discussed earlier, holdup issues have a larger absolute effect when there is greater market potential. Hence, higher π_0^j yields a larger range of matches ϕ such that acquisitions are preferred over joint ownership.

The second set of results in Lemma 3 summarizes the role of contractual completeness, λ. Intuitively, higher λ increases the level of contractual completeness and decreases the loss in profits due to loose ownership, in this case through joint ownership. Hence, relative to both greenfield investment and acquisitions, the region of joint ownership expands with λ.

The final set of result refers to the effect of $d_{k,j}$, where distance makes whole ownership less profitable relative to joint ownership, whether it be greenfield or acquisitions. This results from the assumption that distance has a positive effect on the fixed costs of operating a wholly owned enterprise.

Finally, to motivate the forthcoming empirical exercise (in which we only have data on partial and full acquisitions), we use the results in Lemma 3 to evaluate the effects of π_0^j, λ, and $d_{k,j}$ on the *share* of corporate reallocation that is a full acquisition.[13] Specifically, we are interested in the following measure of acquisition depth

$$S^{k,j} = \frac{1 - G(\phi_A^{k,j})}{1 - G(\phi_J^{k,j})},$$

where $G(\phi)$ is the cumulative distribution function (CDF) of match quality (with probability distribution function (pdf), $g(\phi)$). Note that we require no strong assumptions on the distribution of matches other than being differentiable and identical across markets, which is satisfied if matches are random and firms are uniformly distributed around the circle. Further, since we are not deriving a structural estimating equation, we do not assume a Gumbel distribution as in Head and Ries (2008), or a Pareto as in the other parts of the trade literature.[14] However, our distribution of random matches serves the same purpose as in Head and Ries (2008) to facilitate a measure of acquisition activity in shares that can be taken to the data. Precisely, the following proposition summarizes the effects of π_0^j, λ, and $d_{k,j}$ on the share of full acquisitions.:

Proposition 2 *The effects of the target's market potential π_0^j, industry's contract completeness λ,*

[13]Note that this is similar to Helpman, Melitz, and Yeaple (2004), which lacking domestic sales data, evaluates the relative importance of exporting to FDI.

[14]A Gumbel or Pareto distribution of match quality could represent unobserved matching technologies within our framework. However, again, the main testable implications of the model do not change by making stronger distributional assumptions. We derive the properties of $g(\phi)$ assuming random matching around the circle in the Supplemental Appendix.

and proximity $d_{k,j}$ on the share S of full acquisitions are as follows:

$$\textbf{i}.\quad \frac{\partial S}{\partial \pi_0^j} > 0,$$

$$\textbf{ii}.\quad \frac{\partial S}{\partial \lambda} < 0,$$

$$\textbf{iii}.\quad \frac{\partial S}{\partial d_{k,j}} < 0.$$

Proof. See Appendix. ■

The intuition in Proposition 2 is the same as the intuition for the cutoffs in Lemma 3, although its importance is worthy of a proposition on two levels. First, in the next section, we propose a measure of the share of acquisitions that are 100 percent, using a common merger database that can be linked back to measures of market potential, contractual completeness, and distance. Hence, Proposition 2 details precisely the predictions that we test against the data. Specifically, we test whether (i) the market potential of the target economy has a positive effect on the likelihood of a full acquisition within all firm-to-firm transactions, while (ii) increased contractual completeness or (iii) increased geographic distance reduce this likelihood.

Second, we can present a corollary of Proposition 2 that summarizes the unconditional differences between foreign and domestic acquisitions *within a target market.*

Corollary 1 *Within target market j, domestic acquisitions are more likely to be full acquisitions.*

Proof. Straightforward application of item **iii** in Proposition 2. ■

Corollary 1 makes clear the role of fixed costs in the model. When an acquisition is domestic, the distance between the contracting parties is minimized, which makes standalone operations and acquisitions attractive relative to joint ownership. Since this is an unconditional pattern that we find in the data, we can evaluate the role of distance in explaining this pattern. We now turn to evaluating this and other patterns using a large database of partial and full acquisitions.

4 Empirical Analysis

The model presented in the previous sections delivers a rich set of predictions regarding acquisition depth across industries and countries. Specifically, in Proposition 2, we prove that a greater degree of contractual completeness, a greater distance between the host and source nations, and a target market with lower revenue potential reduces the share of 100 percent acquisitions within all acquisitions.[15] We now utilize a large database of domestic and cross-border mergers and acquisitions (M&As) worldwide over the period 1980-2006 to test these predictions. To begin with, we present broad descriptive statistics for M&As over this period, followed by a discussion of our empirical strategy, the construction of our primary variables, and then the results.

4.1 Data Description

The sample of firm transactions is obtained from the *Thomson SDC Platinum* dataset, which uses regulatory filings, news reports, and public records to build a large database of acquisition behavior across countries and industries.[16]

We adopt a number of sample restrictions that apply to the entire analysis. Specifically we restrict our sample to those observations where the acquirer and the target firms' industry is agriculture (SIC 0), mining and construction (SIC 1) or manufacturing (SIC 2-3). This restriction is chosen for two reasons. First, the model is more suited to study industries that involve investments to produce tangible goods, where our restrictions are dropping industries such as wholesale trade, retail, and banking and finance. Second, and more importantly, our measures of contractual completeness are only available for these industries, and hence, we choose to utilize a consistent sample for the entire analysis. We discuss our measures of contractual completeness in subsection 4.3. We also restrict attention to transactions above a 10% purchase. As some countries (namely, the United States) require additional oversight/disclosure of foreign transactions above this level, this cutoff is applied to the entire sample for consistency. We also address industry-level foreign investment restrictions more precisely in subsection 4.3. Finally, to match the initial acquisition with current observables, and to better capture the idea of market entry, we only include acquisitions where the acquiring firm starts with 0% ownership of the target firm.

Our merger data vary by time, primary 4-digit SIC industry of the acquiring firm and target firm, and country pair. We now briefly describe the data along these three dimensions.[17] In terms of time variation, our data range from 1980 to 2006. As can be seen in Table 1, there is a clear increase in the number of deals after the 1980s, as the number of observations more than quadruples

[15] When testing Proposition 2 against the data, one might be concerned that in the model firms have only one shot at matching, whereas in reality they may be matched repeatedly. While this is a valid concern, our data seem to indicate that this is not actually a pressing issue. Indeed, it is extremely rare to find a partial acquisition later deepened into a full acquisition. Specifically, of all the transactions that were full acquisitions five years after the initial transaction, over 99.7 percent were full acquisitions from the start.

[16] The *Thomson* dataset was initially used in the economics literature by Gugler, Mueller, Yurtoglu, and Zulehner (2003), and later used in Di Giovanni (2005), Breinlich (2008) and Hijzen, Görg, and Manchin (2008).

[17] Our description follows an approach similar to Hijzen, Görg, and Manchin (2008).

when compared to the 1990s. While some of this may be due to better data reporting in the 1990s, the series of merger waves in the late 90's is a frequently cited explanation for the growth in deals. Interestingly, the increase in the number of deals after the 1980s is more pronounced in the case of cross-border transactions. Indeed, while the cross-border transactions accounted for 28% of all deals during the 1980s, they accounted for 33% of the deals in the rest of the sample.

Table 1: M&As by Time Period

Period	Domestic	Cross-Border
1980-1989	6,420	2,436
1990-1999	27,861	13,065
2000-2006	20,324	9,946
Total	54,605	25,447

In terms of industry variation, Table 2 provides a breakdown of M&As by the 1-digit SIC sector of the acquiring and target firms. Two features stand out from the table for both cross-border and domestic acquisitions: (1) most of the deals occur within the 1-digit sector of the acquiring firm, and (2) the vast majority of deals correspond to the manufacturing sector (SIC 2 and 3). Evaluating more closely the first of these points, at the bottom of Table 2 we present how many deals were intra-industry; that is, deals where the acquirer and the target shared the same 4-digit SIC code. As can be seen, 45% of the domestic acquisitions were intra-industry; this figure was particularly high in the case of mining and construction firms (59%) and below average for manufacturing firms (39%). For cross-border acquisitions, manufacturing deals are relatively more important than in the domestic-only case (86% vs. 80% of all deals). However, in this case the share of intra-industry transactions is significantly lower (37%).

Finally, in terms of geographical variation, Table 3 presents the geographical decomposition of our M&A data for all observations and for cross-border transactions only. A list of the countries included in our sample is presented in Appendix D. Clearly, North America and Europe dominate as both acquirers and as targets. Second, not surprisingly, Europe's role is even more important when we only consider the cross-border transactions. Indeed, among the cross-border transactions, those including two European firms account for 34% and those including a European firm and a North American firm account for another 28%—thus, intra-European and North American-European transactions account for almost two thirds of all transactions. Finally, when focusing on cross-border transactions Africa, Latin America and the Caribbean, and (to a smaller degree) Oceania have significantly more target than acquirer firms.

Table 2: M&As by SIC-1 Industry - Domestic and Cross-border

Acquirer Sector	Domestic M&A				Cross-Border M&A			
	Target Sector				Target Sector			
	0	1	2-3	Total	0	1	2-3	Total
0	619	20	308	947	129	10	133	272
1	22	8,581	1,192	9,795	4	2,616	557	3,177
2-3	400	1133	42,330	43,863	165	607	21,226	21,998
Total	1,041	9,734	43,830	54,605	298	3,233	21,916	25,447
Intra-industry	457	5,928	18,169	24,554	80	1,685	7,648	9,413
(%)	44	61	41	45	27	52	35	37

Table 3: Merger and Acquisition counts by Region

		Target Nation						
All Mergers		Africa	Asia	Europe	LAC	N. Am	Oceania	Total
	Africa	543	16	53	3	23	31	669
	Asia	43	4,519	616	45	718	112	6,053
Acquirer	Europe	259	720	26,729	509	3,008	271	31,499
Nation	LAC	7	15	58	1,007	101	4	1,193
	N. Am	178	664	4,094	967	31,329	361	37,594
	Oceania	49	95	153	38	224	2,483	3,042
	Total	1,079	6,030	31,703	2,569	35,404	3,262	80,052
Cross-border		Africa	Asia	Europe	LAC	N. Am	Oceania	Total
	Africa	39	16	53	3	23	31	165
	Asia	43	744	616	45	718	112	2,278
Acquirer	Europe	259	720	8,746	509	3,008	271	13,516
Nation	LAC	7	15	58	187	101	4	373
	N. Am	178	664	4,094	967	2,117	361	8,382
	Oceania	49	95	153	38	224	172	731
	Total	575	2,255	13,720	1,749	6,192	951	25,447

Notes: LAC stands for Latin American and Carribean. Companies classified as "Supranational" as an origin are omitted.

4.2 Empirical Strategy and Variable Definition

In Proposition 2, we prove that a greater degree of contractual completeness, a greater distance between the acquiring and target nations, and a target market with lower revenue potential reduce the share of 100 percent acquisitions within all acquisitions. A main challenge we face in testing these predictions is how to classify joint ownership. On one hand, joint ownership may involve a loose agreement within which two parties work on a project without swapping ownership shares. Indeed, this is the focus of the empirical work in Raff, Ryan, and Stähler (2012), who explicitly evaluate joint ventures that are not a result of M&A. On the other hand, joint projects may involve a limited exchange of ownership shares. Given the difficulty in observing the former group of transactions in our dataset, we focus our empirical work on the latter group, classifying joint ownership as partial ownership, according to the percentage acquired within a transaction between two firms. Hence, our dependent variable for all regressions will be $Full_{g,t}$, which is the share of acquisitions within observational group g in time t that are full (100 percent ownership) acquisitions.[18] Time t will always refer to two-year interval.[19] The observational group g will vary with the level of aggregation that we use to test a specific component of the theory.

Absent observed exogenous shocks in policies to obtain identification, our empirical strategy consists of using fixed effects to absorb all unobserved variation that is not specific to a particular aspect of the theory that we are testing. We start from a relatively aggregate "gravity" perspective, similar to Portes and Rey (2005), Di Giovanni (2005) and Head and Ries (2008), and gradually refine the unit of observation to test industry-specific predictions from the theory.

In terms of the estimation technique, we mostly use OLS within a linear probability setting. Since we are using (in some cases) multiple groups of fixed effects to absorb variation unrelated to the variables of interest, some maximum-likelihood techniques are computationally difficult, or inappropriate on other grounds (eg. incidental parameters). However, given the boundedness of our dependent variable we complement our OLS regressions with conditional fixed-effects logit where appropriate.

[18]These measures are not weighted by the value of the transaction, since values are not consistently reported in *Thomson*.

[19]The one exception is 1980-1982, which is a three year interval. The year grouping is primarily to facilitate analogous logit and OLS regressions using the same exact fixed effects. Using yearly aggregation for OLS leads to similar results, and for logit, also similar results for the specifications that converge.

4.3 Baseline Results

Market Potential

We first focus on part (i) of Proposition 2, which summarizes the role of market potential (π_0) on the composition of M&As within the host market h. In particular, our theory predicts a positive relationship between the market potential and the share of full acquisitions. To study market potential, we begin by collapsing our transaction-level M&A data such that the unit of observation is host nation - source nation - time. At this level of aggregation, a natural candidate to proxy for market potential is the level of development in the host market, which we measure using average GDP per capita from the *Penn World Tables* during that time period.[20] Labeled $\log(Host\ GDP\ per\ Cap_{h,t})$ for host h in time period t, we begin our analysis with the following linear probability model.

$$FULL_{h,s,t} = \alpha_1 \cdot \log(Host\ GDP\ per\ Cap_{h,t}) + \alpha_t + \alpha_{h,s} + \epsilon_{h,s,t} \tag{22}$$

In equation (22), we use host-source fixed effects ($\alpha_{h,s}$) to absorb all factors related to each country and any bilateral relationships. Indeed, aspects of our theory related to distance are absorbed using this choice of fixed effects, as are any time-invariant host or source characteristics (land mass, proximity to ports, etc.). Further, we use time fixed effects (α_t) to absorb common fluctuations in merger activity that are not directly related to host and source markets. The results from estimating equation (22) by OLS are presented in the first two columns in Table 4. In column (1), we use the full sample, and in column (2), we use the sample restricted to only cross-border acquisitions. In both cases, consistent with the theory, we find a positive and significant relationship between host market development and the share of acquisitions within that market that are full acquisitions. In terms of interpretation, the relationship is sizable. Specifically, doubling the log development level of the host nation (which is a reasonable comparison - moving halfway from China to South Korea, for example) increases the share of full acquisitions by roughly 0.20 percentage points, which evaluated at the sample mean share of full acquisitions (0.63), implies an increase of 31%.

The remaining columns in Table 4 evaluate the robustness of this result to the inclusion of measures of source nation development, and to alternative measures of host market potential.[21] With regard to the former, we include $\log(Source\ GDP\ per\ Cap_{s,t})$ to control for the analogous level of development in the source nation. While the theory has little to say on this measure, we include

[20] Fillat, Garetto, and Oldenski (2013) use GDP measures in a similar fashion, evaluating the correlation of demand shocks across locations.

[21] These robustness checks are particularly important given that Blonigen and Piger (2012) find that cross-country regressions are quite sensitive to the set of covariates used.

it for the sake of completeness and, in a slight abuse of language, a falsification check. In columns (3)-(4) of Table 4, we find no significant effect of source development, with very little change to our results using host GDP per capita. In columns (5)-(6), we return to the specification in equation (22) and replace $\log(Host\ GDP\ per\ Cap_{h,t})$ with $\Delta\log(Host\ GDP\ per\ Cap_{h,t})$ that is the average five-year growth rate in host development. This measure may indicate future market potential and be an important indicator used by forward-looking firms.[22] While slightly less pronounced, we again find a positive relationship between host market potential as measured by $\Delta\log(Host\ GDP\ per\ Cap_{h,t})$ and the share of full acquisitions. In columns (7)-(10), we replicate the regressions in columns (3)-(6), but replacing GDP per capita measures with total GDP measures. While conceptually we think that GDP per capita better captures how wealthy consumers are in the host country (and how costly it potentially is to buy out a local firm), total GDP could be a good measure in the case of firms producing goods on a massive scale, making profits out of volume of sales. In any case, we find that the results in columns (7)-(10) are qualitatively similar, with higher host market GDP and GDP growth associated with a higher share of full acquisitions, and source country GDP with no effect.

Finally, in Table 5, we complement our OLS results in Table 4 by estimating equation (22) using a conditional fixed-effects logistic regression. The results are broadly consistent with the baseline results in Table 4, where higher host GDP and GDP per capita, in levels and in growth rates, leads to a higher share of full acquisitions.

Distance and Market Potential

The estimates in Tables 4 and 5 describe the relationship between target market potential and the composition of acquisitions within host-source pairs and years. Doing so absorbs all variation in distance, which is the focus of part (ii) in Proposition 2. Specifically, the theory predicts that there should be a negative relationship among the distance (between host and source countries) and the share of full acquisitions. Hence, we now adjust the regression in equation (22) to focus on the distance between host and source and host market potential:

$$FULL_{h,s,t} = \alpha_1 \cdot \log(Host\ GDP\ per\ Cap_{h,t}) + \alpha_2 \cdot \log(Dist_{h,s}) + \alpha_h + \alpha_{s,t} + \epsilon_{h,s,t} \quad (23)$$

In equation (23), the fixed-effect strategy now absorbs variation attributable to source-time groups $\alpha_{s,t}$ and host groups α_h. Hence, our estimates are cross-sectional, primarily using variation within

[22]As an example, the average five-year growth rate for 2005-2006 is the average of log growth between 2000 and 2005, and 2001 and 2006.

a given source-time group across host markets, but also controlling for the fact that some host markets may be more amenable to full acquisitions.

As in equation (22), we include $\log(Host\ GDP\ per\ Cap_{h,t})$ as a measure of host market potential, and for robustness we again use the alternate measures of market potential from Tables 4 and 5. We also include $\log(Dist_{h,s})$ in equation (23), which measures the log of distance in kilometers between the host and source markets, or if a domestic acquisition, the average distance between producers and consumers in that country. Both measures are obtained from the CEPII's "geodist" dataset, which is documented in Mayer and Zignago (2011).

The results from estimating equation (23) by OLS are presented in Table 6. As the model predicts, there is a significant negative relationship between between distance and the share of full acquisitions. Interestingly, in the even-numbered columns we find that the effects of distance on the share of full acquisitions is more modest and less significant when looking at cross-border M&As. Within the sample of only cross-border M&As, there is less variation in the distance between host and source, and hence, identifying the relationship between distance and the share of full acquisitions within only relatively large distances.[23] Since the sample restriction is absorbing much of the variation in distance, this is exactly as predicted in Corollary 1.[24] Additionally, we find that the previously evaluated effects of market potential are still large and highly significant, where higher development in host markets yields a higher share of full acquisitions.

Contract Completeness and Acquisition Depth

The results in Tables 4-6 are obtained using a sample that is constructed by host-source-time groups. However, in part (iii) of Proposition 2, we detail how contract completeness—an industry level object—affects the composition of acquisitions within each market, reducing the share of full acquisitions. To evaluate the role of contract completeness, we now refine the level of aggregation in our dataset to host (h), source (s), 4-digit SIC industry of the target (i) and time (t). The industry dimension of our dataset is similar to Breinlich (2008), and the bilateral-industry-time dimension is similar to Hijzen, Görg, and Manchin (2008). At this more disaggregate level, we regress the share of acquisitions that are full on a measure of contract completeness in industry i, $Completeness_i$, the log of distance between host and source countries, source dummies, and fixed effects defined by

[23]Within the domestic and cross-border sample, mean log distance is 7.85 and standard deviation 1.38. Within the cross-border sample, the mean log distance is 8.06 and the standard deviation 1.18.

[24]We do not estimate using logit for Table 6 since too many host dummies leads to convergence issues.

host, time, and the 2-digit SIC industry (r) of the target.

$$FULL_{i,r,h,s,t} \quad = \quad \alpha_1 \cdot Completeness_i + \alpha_2 \cdot \log(Dist_{h,s}) + \alpha_s + \alpha_{r,h,t} + \epsilon_{i,r,h,s,t} \tag{24}$$

In choosing the definition of fixed effects in equation (24), the goal is to absorb as much variation as possible that is specific to the market potential of the target firm's 2-digit industry, but without absorbing the measures of contract completeness which are defined at the 4-digit SIC level. Further, we do not include source country in the definition $\alpha_{r,h,t}$ so that we can evaluate the role of distance when controlling for shocks to the host country in the 2-digit industry of the target. However, we do control for source fixed effects to control for time-invariant propensities of full acquisitions by source.

To construct $Completeness_i$, we utilize contract intensity measures from Nunn (2007), where an industry's contract intensity is measured by the share of inputs that are procured from differentiated-good industries. As these measures are calculated using BEA industry definitions, we develop a concordance to the US SIC87 4-digit industry definitions that are used in the merger data.[25] Once matched, we then subtract from 1 to obtain our measure of contract completeness for target industry i, $Completeness_i$. The average value of completeness in the sample we use below is 0.303, but ranges from zero to 1. Overall, this measure captures the idea that those industries that need a larger share of differentiated inputs (difficult to contract) are more prone to suffer from contractual problems. In contrast, those industries dealing with homogeneous, easy-to-contract inputs will generally enjoy a more complete contract environment.

In estimating equation (24), we make additional sample adjustments to address the issue of foreign investment restrictions in host countries. Somewhat prevalent, and almost always hard to measure (or unobserved), foreign investment restrictions have slowly been liberalized over a number of years.[26] Our goal is to focus the analysis on those countries and industries that explicitly allow for foreign acquisitions of all types. To do so, we keep in the sample those host country - 2-digit industry - time groups (ie. the same refinement as the fixed effects) such that we observe at least one full cross-border acquisition from any source, and at least one partial cross-border acquisition from any source. This sample restriction guarantees that host-industry-time groups included in the sample have no explicit prohibitions over cross-border acquisitions or the type of cross-border acquisition.[27]

[25] We use 1977 as our baseline year from the BEA to use a consistent set of IO tables from the beginning of the sample. When there are multiple matches between the BEA data and SIC, we weight by the value of inputs used. A copy of our concordance files is available upon request.

[26] See Chhibber and Majumdar (1999) for the case of India.

[27] Raff, Ryan, and Stähler (2012) utilize a more aggregate sample restriction, only including countries in the sample

The results from estimating equation (24) via OLS and logit on the restricted sample are presented in Table 7. In column (1), we find that a higher level of contract completeness is associated with a lower share of full acquisitions, and that a greater distance between host and source is also associated with a lower share of full acquisitions. In column (5), we run the analogous fixed-effect logit regression, and find that the results are robust to bounding the dependent variable. In columns (2) and (6), we make the same comparison between OLS and logit, but only using the sample of cross-border acquisitions. Here, we find that the role of contract completeness is still significant and slightly larger, although the effect of distance is now much smaller and insignificant. However, when adding in source dummies, in columns (3) and (4) we find that distance is once again significant.[28]

Overall, we find robust support for our predictions in the data. Indeed, as our theory suggests, the data indicate that the share of full acquisitions is positively related to the host market potential, negatively related to the distance between the host and source nations, and negatively related to the degree of contract completeness of the industry. Next, we provide some extensions to further check the robustness of our findings.

4.4 Extensions

Assortative Matching

There is evidence that joint ownership and full acquisitions do not arise randomly. In some cases, the best assets are targeted by the best firms (Arnold and Javorcik (2005)). In other cases, firms seek relatively good assets that are in a period of distress (Blonigen, Fontagné, Sly, and Toubal (2012)), or assets with relatively low productivity (Lichtenberg and Siegel (1987)). While our model is silent on these issues, we now examine empirically the robustness of our results when accounting for the degree of assortative matching within the merger market.

Indeed, the issues of assortative matching are not just an empirical indulgence. Specifically, a buying firm may in fact be more discerning within certain industries, and hence, yield a relevant omitted variables problem. For example, this could be the case due the scarce nature of capabilities in a given target market, that makes buyers be particularly careful when looking for targets—if so, this (and not contracts per se) may also increase the share of full acquisitions that we observe in the data.

that do not report having significant foreign investment prohibitions. These countries include Australia, Belgium, Canada, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland-Rep, Italy, Netherlands, New Zealand, Poland, Portugal, Spain, Sweden, United Kingdom and United States. Testing our predictions against this sample of countries leads to similar (or more supportive) results, and are available in the supplemental technical appendix.

[28]With source dummies, we are unable to run a fixed-effects logit due to the sheer number of dummies to be estimated.

To evaluate this issue, we add to our industry-level analysis a measure of assortative matching within each target 4-digit SIC industry. In particular, for each 4-digit SIC target industry, we collect all transaction-level observations such the acquiring firm and target firm report sales. Although the number of observations where this is the case is low relative to the full sample—8.2% of transactions have target and acquiring firm sales—it will be sufficient for our simple measure of assortative matching.[29] Specifically, to construct a 4-digit SIC measure of assortative matching we correlate target and acquiring firm log sales within each 4-digit SIC target industry. The correlation is positive for 90% of 4-digit SIC industries, with a mean of 0.369, both highlighting the positive association between host and target size. However, the correlations essentially range from -1 to 1, and exhibit sufficient variation. Labeling this correlation *Assort*, we then add it to the industry level regressions. The idea is that *Assort* accounts for the degree in which big/efficient firms buy (are matched to) other big/efficient firms. These regressions are presented in Table 8. The results indicate that there is no appreciable difference in results when accounting for the degree of assortative matching (as measured by the correlation in *Assort*). Hence, while the existing literature does make a distinction regarding assorting matching, our results indicate that the effects of assortative matching do not contaminate the impact of contract completeness or distance within target markets.

Intra and Inter-industry Acquisitions

As a final empirical exercise, we account for additional industry dimensions of the data. One of the interesting features of the dataset (and mergers more generally) is the relatively large number of acquisitions that occur outside the acquiring firm's 4-digit SIC category. On a very broad level, acquisitions in other industries from a firm's primary industry might indicate vertical acquisitions of input suppliers or perhaps brand expansion into other products and industries. Indeed, the existing literature has looked at these issues from the perspective of international mergers in Hijzen, Görg, and Manchin (2008), and from a closed economy perspective in Spearot (2012). However, both incentives are are not captured by our model, and hence, a more refined analysis is warranted to evaluate the extent to which intra and inter-industry acquisitions differ in acquisition depth as a function of observables.

To do so, we now refine the level of observation in our dataset to host (h), source (s), target 4-digit SIC industry (i), acquiring firm 4-digit SIC industry (j) and time (t). Using this sample, we run the following regression allowing for the role of completeness and distance to vary by whether

[29] We would rather construct a measure of productivity, but factors are even more infrequently reported than sales.

or not an observation corresponds to an intra-industry or inter-industry acquisition.

$$\begin{aligned} FULL_{i,j,r,h,s,t} &= \alpha_1 \cdot Completeness_i + \alpha_2 \cdot \log(Dist_{h,s}) + \alpha_3 \cdot D_{Inter} \\ &+\alpha_1^c \cdot Completeness_i \cdot D_{Inter} + \alpha_2^c \cdot \log(Dist_{h,s}) \cdot D_{Inter} \\ &+\alpha_s + \alpha_{r,h,t} + \epsilon_{i,j,r,h,s,t} \end{aligned} \tag{25}$$

In equation (25), D_{Inter} is a dummy variable that identifies acquisitions that occur outside of the acquiring firm's primary SIC industry. We evaluate the results when defining the acquiring firm's industry at the 2-digit level, and the 4-digit level. Other than interacting contract completeness and distance with this dummy variable, we adopt the same restricted sample and definition of fixed effects as in Table 7 and equation (24).

The results from estimating equation (25) are presented in Table 9. The first three columns define inter-industry acquisitions as outside the acquiring firm's primary 2-digit SIC category, and the last three columns define inter-industry acquisitions as outside the acquiring firm's 4-digit SIC category. First, we focus on the role of contract completeness, which is summarized in the first two rows. In the first row, we report the coefficient on $Completeness_i$ that is not interacted with the inter-industry acquisition indicator; that is, the role of completeness for intra-industry acquisitions. As in our previous tables, the coefficient is negative and highly significant, as the model predicts. When we focus on the second row, we find that the interaction between $Completeness_i$ and D_{Inter} is modestly positive but insignificant across the board. This implies that the role of contract completeness in the target industry is important as the model predicts, especially for intra-industry acquisitions. Although not as pronounced, the effect of completeness in columns (1) and (4) for inter-industry acquisitions is also significantly negative.[30]

Finally, when we focus on the role of distance, in the third and fourth rows of Table 9, we find that the role of distance is negative and significant for intra-industry acquisitions, but much less pronounced for inter-industry acquisitions. While our model is mostly silent on the issues of intra and inter-industry acquisitions, recall that integration costs in the model are a function of a distance and non-distance component. Thus, if we view additional integration costs for an inter-industry acquisition shifting up the non-distance component, then intuitively, the role of distance should be less pronounced in the case of inter-industry acquisitions.

[30]Precisely, compared to a null value of zero, the p-values for the estimates of $\alpha_1 Completeness_i + \alpha_1^c Completeness_i \cdot D_{Inter}$, are 0.0058 and 0.0048, respectively.

5 Conclusion

We have presented a model of foreign direct investment in which MNEs match with firms in a local market. When the MNEs match, they choose between incomplete contractual relationships with no fixed costs (joint ownership) and full ownership with integration costs (acquisitions). When they fail to find a sufficiently good match, they instead undertake greenfield investment. In equilibrium, ex ante identical multinationals enter the local matching market, and, ex post, three different types of ownership within a heterogeneous group of firms arise. In particular, the worst matches dissolve and the MNEs invest greenfield, the middle matches operate under joint ownership, and the best matches integrate via full acquisitions.

We have also shown that joint ownership is more common when the host country has lower revenue potential and when it is farther away from the source country. Further, we have shown that joint ownership is more common when contract intensity is lower. We find robust empirical support for these predictions, using a large database of country and industry acquisitions patterns, where greater distance between host-source country pairs, host markets with less revenue potential, as measured by GDP, and a less-intensive contract environment lead to more joint ownership.

In future work, we intend to focus on the endogenous choice of the type of products that a firm brings to a local market as a function of the investment mode. Indeed, since many policies restrict the types of foreign investments that are permissible, this focus may elucidate the ramifications of such policies when technology transfer depends on the type of products that a firm brings into a local market. Further, we plan to extend the model to a dynamic setting with repeated search to examine how firms optimally adjust or abandon matches in response to shocks.

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Appendix

A Section 2

To save on notation within these derivations, we use $\lambda(0)$ and $\lambda(1)$ to represent $\lim_{\gamma\to 0}\lambda(\gamma)$ and $\lim_{\gamma\to 1}\lambda(\gamma)$, respectively.

A.1 Lemma 1

Recall from section 2 that

$$\lambda(\gamma) \equiv \frac{1-\beta\left(\frac{2-\gamma}{2}\right)}{1-\beta}\left(\frac{1}{2}\right)^{\frac{\beta}{1-\beta}\gamma}.$$

It is clear from above that $\lambda(0) = 1$. To sign the derivative with respect to γ, we first take natural logs (written log) to get:

$$\log(\lambda(\gamma)) = \log\left(1-\beta+\gamma\frac{\beta}{2}\right) - \log(1-\beta) + \frac{\beta}{1-\beta}\gamma\log(1/2).$$

Differentiating with respect to γ:

$$\frac{1}{\lambda}\frac{\partial\lambda}{\partial\gamma} = \frac{\beta/2}{1-\beta+\gamma\frac{\beta}{2}} + \frac{\beta}{1-\beta}\log(1/2).$$

Factoring out $\frac{\beta}{1-\beta}$, we get:

$$\frac{1}{\lambda}\frac{\partial\lambda}{\partial\gamma} = \frac{\beta}{1-\beta}\left(\frac{\frac{1-\beta}{2}}{1-\beta+\beta\gamma/2} + \log(1/2)\right).$$

Dividing the first fraction within the parenthesis by $\frac{1-\beta}{2}$, we have:

$$\frac{1}{\lambda}\frac{\partial\lambda}{\partial\gamma} = \frac{\beta}{1-\beta}\left(\frac{1}{2+\frac{\beta}{1-\beta}\gamma} + \log(1/2)\right).$$

Noting that $\log(1/2) < -\frac{1}{2}$, and that $\frac{1}{2+\frac{\beta}{1-\beta}\gamma}$ is bounded between zero and 1/2, it follows that $\frac{\partial\lambda}{\partial\gamma} < 0$.

A.2 Lemma 2

In this appendix, we show that $\lambda(0)\phi(d) = \phi(d)$ and $\lambda(1)\phi(d) < 1$ for all d and β. To begin, since $\lambda(0) = 1$ from above, the first result is immediate. In terms of the section, note that $\lambda(1)\phi(d) < 1$

can be written as follows:

$$\lambda(1)\phi(d) = \frac{1-\frac{\beta}{2}}{1-\beta}\left(\frac{1}{2}\right)^{\frac{\beta}{1-\beta}} \exp\left(\frac{\beta}{1-\beta}\frac{d(1-d)}{2}\right). \tag{A-1}$$

Clearly, as a function of d, $\lambda(1)\phi(d)$ is maximized when $d = \frac{1}{2}$. Plugging in $d = \frac{1}{2}$, we have:

$$\lambda(1)\phi(1/2) = \frac{1-\frac{\beta}{2}}{1-\beta}\left(\frac{1}{2}\right)^{\frac{\beta}{1-\beta}} \exp\left(\frac{\beta}{1-\beta}\frac{1}{8}\right).$$

Next, to show that $\lambda(1)\phi(1/2) < 1$ for all β, take logs to get:

$$\log\left(\lambda(1)\phi(1/2)\right) = \log\left(1-\frac{\beta}{2}\right) - \log\left(1-\beta\right) + \frac{\beta}{1-\beta}\log\left(\frac{1}{2}\right) + \frac{\beta}{1-\beta}\frac{1}{8}.$$

Substituting $\beta = 0$ we get:

$$\log\left(\lambda(1)\phi(1/2)\right) = \log\left(1\right) - \log\left(1\right) + \frac{0}{1}\log\left(\frac{1}{2}\right) + \frac{0}{1}\frac{1}{8} = 0.$$

Clearly, $\log\left(\lambda(1)\phi(1/2)\right)|_{\beta=0} = 0$, or put differently, $\lambda(1)\phi(1/2)|_{\beta=0} = 1$. Next differentiating $\log\left(\lambda(1)\phi(1/2)\right)$ with respect to β, we get:

$$\frac{\partial \log\left(\lambda(1)\phi(1/2)\right)}{\partial\beta} = -\frac{1}{2-\beta} + \frac{1}{1-\beta} + \frac{1}{(1-\beta)^2}\left(\log\left(\frac{1}{2}\right) + \frac{1}{8}\right).$$

Factoring out $\frac{1}{(2-\beta)(1-\beta)}$, we get:

$$\frac{\partial \log\left(\lambda(1)\phi(1/2)\right)}{\partial\beta} = \frac{1}{(2-\beta)(1-\beta)}\left(1 + \underbrace{\left(\log\left(\frac{1}{2}\right) + \frac{1}{8}\right)}_{<-\frac{1}{2}} \cdot \underbrace{\frac{(2-\beta)}{(1-\beta)}}_{\in(2,\infty)}\right) < 0.$$

Hence, given that $\left(\lambda(1)\phi(1/2)\right)|_{\beta=0} = 1$, and $\frac{\partial \log(\lambda(1)\phi(1/2))}{\partial\beta} < 0$, it must be the case that $\lambda(1)\phi(d) < 1$ for all $d \in [0, 1/2]$ and $\beta \in (0, 1)$.

B Derivation of Figure 3

In this appendix, we present all preference conditions used to construct Figure 3. Recall that our benchmark case is $1 < \phi_J < \phi_A < \hat{\phi}$.

First, we have that $1 < \phi_J$ *iff* $F_G < (2 - \lambda)\pi_0$. This condition establishes a upper bound for the fixed cost of greenfield investment. Indeed, if F_G is greater than the latter expression, when the cost of greenfield investment is sufficiently high, then J dominates G—so G would not be observed in equilibrium. This is the right-most vertical line in Figure 3.

Second, $\phi_A < \hat{\phi}$ *iff* $F_A < (1 - \lambda)\hat{\phi}\pi_0$. Analogously to the previous paragraph, this condition sets an upper bound for the fixed cost of an acquisition. If F_A is higher than the last expression, J dominates A. This condition represents the upper-most horizontal line in Figure 3.

Third, $\phi_J < \hat{\phi}$ *iff* $F_G > (2 - \lambda\hat{\phi})\pi_0$. This is a lower bound condition on F_G, and the left-most vertical line in Figure 3. This condition is not met when the cost of greenfield investment is sufficiently low, and G dominates J.

Fourth, $1 < \phi_A$ *iff* $F_A > (1 - \lambda)\pi_0$. This set a lower bound on F_A such that, whenever the fixed cost of an acquisition is below this condition, J is dominated by A. This is the lowest horizontal line in Figure 3.

Finally, we address the fixed costs such that $\phi_J < \phi_A$. This condition is satisfied whenever the following condition holds:

$$\frac{1-\lambda}{\lambda}(2\pi_0 - F_G) < F_A$$

This condition is crucial in the sense that it provides a link between both fixed costs such that there is sufficient "room" in the parameter space for all three organizational forms to exist. Indeed, this expression provides the requirements for J to exist in equilibrium even when the fixed costs are below their respective upper bounds.

C Comparative Statics

C.1 Lemma 3: Match Quality Cutoffs

To solve for the changes to match quality cutoffs, recall that :

$$\begin{aligned} \phi_J &= \frac{1}{\lambda}\frac{2\pi_0^j - \psi_G \cdot d_{k,j}}{\pi_0^j} \\ \phi_A &= \frac{\tilde{F}_A + \psi_A \cdot d_{k,j}}{(1-\lambda)\pi_0^j}. \end{aligned}$$

Differentiating with respect to π_0^j, we get:

$$\begin{aligned} \frac{\partial \phi_J}{\partial \pi_0^j} &= \frac{\psi_G d_{k,j}}{\lambda\left(\pi_0^j\right)^2} > 0 \\ \frac{\partial \phi_A}{\partial \pi_0^j} &= -\frac{\tilde{F}_A + \psi_A d_{k,j}}{(1-\lambda)\left(\pi_0^j\right)^2} < 0. \end{aligned}$$

Next, we differentiate with respect to λ to obtain the second set of results:

$$\begin{aligned} \frac{\partial \phi_J}{\partial \lambda} &= -\frac{1}{\lambda^2}\frac{2\pi_0^j - \psi_G d_{k,j}}{\pi_0^j} < 0 \\ \frac{\partial \phi_A}{\partial \lambda} &= \frac{\tilde{F}_A + \psi_A d_{k,j}}{(1-\lambda)^2\pi_0^j} > 0. \end{aligned}$$

Note that $\frac{\partial \phi_J}{\partial \lambda} < 0$ only if $\phi_J > 0$, which is guaranteed since we assume $\pi_0 > F_G$.

Finally, differentiating the cutoffs with respect to $d_{k,j}$, we get:

$$\begin{aligned} \frac{\partial \phi_J}{\partial d_{k,j}} &= -\frac{\psi_G}{\lambda\pi_0^j} < 0 \\ \frac{\partial \phi_A}{\partial d_{k,j}} &= \frac{\psi_A}{(1-\lambda)\pi_0^j} > 0. \end{aligned}$$

Note that $\frac{\partial \phi_J}{\partial \lambda} < 0$ only if $\phi_J > 0$.

C.2 Proposition 2: Acquisition Share

Defining the share of acquisitions as S and the distribution of match qualities by the twice differentiable CDF $G(\phi)$ (pdf $(g(\phi))$) we have:

$$S = \frac{1 - G(\phi_A)}{1 - G(\phi_J)}.$$

First, by differentiating S with respect to π_0^j, we get:

$$\frac{\partial S}{\partial \pi_0^j} = \frac{1}{\left(1 - G(\phi_J)\right)^2} \left(-g(\phi_A) \underbrace{\frac{\partial \phi_A}{\partial \pi_0^j}}_{-} \left(1 - G(\phi_J)\right) + g(\phi_J) \underbrace{\frac{\partial \phi_J}{\partial \pi_0^j}}_{+} \left(1 - G(\phi_A)\right) \right) > 0.$$

Next, differentiating S with respect to λ, we get:

$$\frac{\partial S}{\partial \lambda} = \frac{1}{\left(1 - G(\phi_J)\right)^2} \left(-g(\phi_A) \underbrace{\frac{\partial \phi_A}{\partial \lambda}}_{+} \left(1 - G(\phi_J)\right) + g(\phi_J) \underbrace{\frac{\partial \phi_J}{\partial \lambda}}_{-} \left(1 - G(\phi_A)\right) \right) < 0.$$

Finally, we differentiate S with respect to $d_{k,j}$:

$$\frac{\partial S}{\partial d_{k,j}} = \frac{1}{\left(1 - G(\phi_J)\right)^2} \left(-g(\phi_A) \underbrace{\frac{\partial \phi_A}{\partial d_{k,j}}}_{+} \left(1 - G(\phi_J)\right) + g(\phi_J) \underbrace{\frac{\partial \phi_J}{\partial d_{k,j}}}_{-} \left(1 - G(\phi_A)\right) \right) < 0.$$

D Sample Countries

Country	Source	Host	Country	Source	Host	Country	Source	Host
Afghanistan	X	X	Germany	X	X	Norway	X	X
Albania		X	Ghana	X	X	Oman	X	X
Algeria	X	X	Greece	X	X	Pakistan	X	X
Angola		X	Guatemala	X	X	Panama	X	X
Antigua		X	Guinea	X	X	Papua N Guinea	X	X
Argentina	X	X	Guyana		X	Paraguay		X
Armenia	X	X	Haiti		X	Peru	X	X
Australia	X	X	Honduras	X	X	Philippines	X	X
Austria	X	X	Hong Kong	X	X	Poland	X	X
Azerbaijan	X	X	Hungary	X	X	Portugal	X	X
Bahamas	X	X	Iceland	X	X	Puerto Rico	X	X
Bahrain	X	X	India	X	X	Qatar		X
Bangladesh	X	X	Indonesia	X	X	Rep of Congo	X	X
Barbados	X	X	Iran	X	X	Romania	X	X
Belarus		X	Ireland-Rep	X	X	Russian Fed	X	X
Belgium	X	X	Israel	X	X	Saudi Arabia	X	X
Belize		X	Italy	X	X	Senegal		X
Benin		X	Ivory Coast	X	X	Serbia		X
Bermuda	X	X	Jamaica	X	X	Sierra Leone	X	X
Bolivia	X	X	Japan	X	X	Singapore	X	X
Bosnia	X	X	Jordan	X	X	Slovak Rep	X	X
Botswana	X	X	Kazakhstan	X	X	Slovenia	X	X
Brazil	X	X	Kenya	X	X	Solomon Is	X	X
Bulgaria	X	X	Kuwait	X	X	South Africa	X	X
Burkina Faso		X	Kyrgyzstan		X	South Korea	X	X
C. African Rep		X	Laos		X	Spain	X	X
Cambodia		X	Latvia	X	X	Sri Lanka	X	X
Cameroon	X	X	Lebanon	X	X	Sudan	X	X
Canada	X	X	Lesotho		X	Swaziland	X	X
Cape Verde		X	Libya	X	X	Sweden	X	X
Chad	X		Lithuania	X	X	Switzerland	X	X
Chile	X	X	Luxembourg	X	X	Syria		X
China	X	X	Macau		X	Taiwan	X	X
Colombia	X	X	Macedonia	X	X	Tajikistan		X
Costa Rica	X	X	Madagascar		X	Tanzania	X	X
Croatia	X	X	Malawi		X	Thailand	X	X
Cuba		X	Malaysia	X	X	Togo	X	X
Cyprus	X	X	Mali		X	Trinidad&Tob	X	X
Czech Republic	X	X	Malta		X	Tunisia	X	X
Denmark	X	X	Mauritania		X	Turkey	X	X
Dominican Rep	X	X	Mauritius	X	X	Uganda	X	X
Ecuador	X	X	Mexico	X	X	Ukraine	X	X
Egypt	X	X	Moldova	X	X	United Kingdom	X	X
El Salvador	X	X	Mongolia		X	United States	X	X
Equator Guinea		X	Morocco	X	X	Uruguay	X	X
Eritrea		X	Mozambique		X	Utd Arab Em	X	X
Estonia	X	X	Namibia		X	Uzbekistan	X	X
Ethiopia	X	X	Nepal		X	Venezuela	X	X
Fiji	X	X	Netherlands	X	X	Vietnam	X	X
Finland	X	X	New Zealand	X	X	Yemen	X	X
France	X	X	Nicaragua		X	Yugoslavia	X	X
Gabon	X	X	Niger		X	Zambia	X	X
Georgia	X	X	Nigeria	X	X	Zimbabwe	X	X

Table 4: Host and Source Market Potential - Within Country Pair - OLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
log(*Host GDPPC*)	0.187***	0.230***	0.190***	0.225***						
	(0.067)	(0.073)	(0.069)	(0.074)						
log(*Source GDPPC*)			-0.016	0.049						
			(0.081)	(0.087)						
Δ log(*Host GDPPC*)					0.085	0.109*				
					(0.054)	(0.062)				
log(*Host GDP*)							0.144**	0.176***		
							(0.062)	(0.066)		
log(*Source GDP*)							-0.059	-0.007		
							(0.070)	(0.076)		
Δ log(*Host GDPPC*)									0.095*	0.116*
									(0.053)	(0.062)
Observations	6,583	5,935	6,520	5,872	6,497	5,857	6,520	5,872	6,497	5,857
R^2	0.560	0.567	0.556	0.563	0.559	0.565	0.556	0.563	0.559	0.565
Cross-border Only?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Dependent variable is the share of full acquisitions. Estimation technique is OLS. Unit of observation is Host nation - Source nation - Time. Host-Source, and Year Fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Host and Source Market Potential - Within Country Pair - Logit

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
log(*Host GDPPC*)	1.453***	1.488***	1.335***	1.410***						
	(0.452)	(0.478)	(0.463)	(0.479)						
log(*Source GDPPC*)			0.649	0.995						
			(0.620)	(0.690)						
Δ log(*Host GDPPC*)					0.663*	0.721*				
					(0.361)	(0.384)				
log(*Host GDP*)							0.892**	0.924**		
							(0.436)	(0.448)		
log(*Source GDP*)							0.345	0.614		
							(0.540)	(0.587)		
Δ log(*Host GDP*)									0.692*	0.749**
									(0.359)	(0.382)
Observations	6,583	5,935	6,520	5,872	6,497	5,857	6,520	5,872	6,497	5,857
Cross-border Only?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Dependent variable is the share of full acquisitions. Estimation technique is conditional fixed-effects logit. Unit of observation is Host nation - Source nation - Time. Host-Source, and Year Fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Market Potential and Proximity - within Source-Year and Host

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(*distance*)	-0.022***	-0.011*	-0.023***	-0.012*	-0.022***	-0.011*	-0.022***	-0.012*
	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.006)
log(*Host GDPPC*)	0.193***	0.209***						
	(0.058)	(0.062)						
Δ log(*Host GDPPC*)			0.140***	0.159***				
			(0.051)	(0.052)				
log(*Host GDP*)					0.116**	0.124**		
					(0.054)	(0.056)		
Δ log(*Host GDPPC*)							0.151***	0.169***
							(0.050)	(0.052)
Observations	6,267	5,786	6,188	5,710	6,267	5,786	6,188	5,710
R^2	0.329	0.345	0.327	0.341	0.328	0.344	0.327	0.342
Cross-border Only?	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Dependent variable is the share of full acquisitions. Estimation technique is OLS. Unit of observation is Host nation - Source nation - Time. Source-Year, and Host Fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Contract Completeness and Proximity - within Host- Industry - Year

	(1)	(2)	(3)	(4)	(5)	(6)
Completeness	-0.046***	-0.053**	-0.051***	-0.049**	-0.358***	-0.341**
	(0.014)	(0.023)	(0.014)	(0.023)	(0.113)	(0.138)
log(*distance*)	-0.025***	-0.004	-0.029***	-0.012**	-0.241***	-0.028
	(0.002)	(0.004)	(0.002)	(0.005)	(0.016)	(0.024)
Observations	21,474	12,427	21,474	12,427	21,474	12,427
R^2	0.212	0.218	0.236	0.254		
Cross-border Only?	No	Yes	No	Yes	No	Yes
Source Dummies	No	No	Yes	Yes	No	No
Estimation	OLS	OLS	OLS	OLS	Logit	Logit

Notes: Dependent variable is the share of full acquisitions. Unit of observation is Host nation - Source nation - Target SIC4 Industry -Time. All regressions include Host - SIC2 Industry - Year fixed effects. Source fixed effects as indicated within the table. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Completeness, Proximity, and Assortative Matching - within Host-Industry-Year

	(1)	(2)	(3)	(4)	(5)	(6)
Completeness	-0.043***	-0.053**	-0.048***	-0.050**	-0.336***	-0.334**
	(0.015)	(0.024)	(0.015)	(0.024)	(0.117)	(0.142)
log(*distance*)	-0.025***	-0.004	-0.028***	-0.011**	-0.237***	-0.025
	(0.002)	(0.004)	(0.002)	(0.005)	(0.016)	(0.024)
Assort	0.012	0.022	0.013	0.021	0.120*	0.140
	(0.009)	(0.016)	(0.009)	(0.015)	(0.070)	(0.088)
Observations	20,707	12,082	20,707	12,082	20,707	12,082
R^2	0.215	0.224	0.240	0.260		
Cross-border Only?	No	Yes	No	Yes	No	Yes
Source Dummies	No	No	Yes	Yes	No	No
Estimation	OLS	OLS	OLS	OLS	Logit	Logit

Notes: Dependent variable is the share of full acquisitions. Unit of observation is Host nation - Source nation - Target SIC4 Industry -Time. All regressions include Host - SIC2 Industry - Year fixed effects. Source fixed effects as indicated within the table. *Assort* is the firm-level correlation between target sales and acquiring firm sales within each Target SIC4 Industry. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Completeness, Proximity, and Intra-industry Investment - within Host-Industry-Year

	(1)	(2)	(3)	(4)	(5)	(6)
$Completeness$	-0.037***	-0.056**	-0.051**	-0.045***	-0.072**	-0.065**
	(0.013)	(0.025)	(0.025)	(0.016)	(0.030)	(0.030)
$Completeness$ x D_{Inter}	-0.004	0.030	0.028	0.011	0.039	0.035
	(0.016)	(0.030)	(0.030)	(0.016)	(0.028)	(0.028)
$log(distance)$	-0.029***	-0.009**	-0.017***	-0.033***	-0.010*	-0.018***
	(0.002)	(0.004)	(0.005)	(0.003)	(0.005)	(0.006)
log($Distance$) x D_{Inter}	0.012***	0.013**	0.015**	0.013***	0.009	0.010
	(0.004)	(0.006)	(0.006)	(0.004)	(0.006)	(0.006)
D_{Inter}	-0.096***	-0.113**	-0.136***	-0.102***	-0.083*	-0.092*
	(0.025)	(0.052)	(0.051)	(0.025)	(0.049)	(0.048)
Observations	32,804	13,762	13,762	32,804	13,762	13,762
R^2	0.209	0.213	0.246	0.209	0.212	0.246
Cross-border Only?	No	Yes	Yes	No	Yes	Yes
Source Dummies	No	No	Yes	No	No	Yes
Cross Industry	SIC2	SIC2	SIC2	SIC4	SIC4	SIC4

Notes: Dependent variable is the share of full acquisitions. Unit of observation is Host nation - Source nation - Target SIC4 Industry - Acquirer SIC4 Industry - Time. All regressions include Host - Target SIC2 Industry - Year fixed effects. Source fixed effects as indicated within the table. D_{Inter} is a dummy variable that identifies cross-industry acquisitions as defined in the last row of the Table. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1