The Geographic Organization of Multinational Firms in a Multi-Country World: Theory and Evidence*

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Abstract

Theories on foreign direct investment (FDI) typically make at least one of two assumptions: a firm's market entry decision is independent of its actions elsewhere, or all affiliates are manufacturers. Recent research has found that third countries affect FDI inflows, and that many affiliates do not manufacture anything. This paper addresses both issues. It examines a firm's market access decision in a three-country heterogeneous firms framework. Among the options are establishing a manufacturing affiliate or a wholesale affiliate. Firms choosing the former are found to be more likely to enter a nearby market that they otherwise would not. Wholesale FDI is the more likely form of entry there. Both predictions are tested using hand collected firm-level data for French firms. Strong support is found for the model's predictions. I also find that wholesale FDI is preferred in more *distant* markets. This is consistent with the hypothesis that wholesale affiliates are established primarily to facilitate exports from nearby manufacturing affiliates, not from the parent as has been heretofore assumed by literature.

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1 Introduction

How do multinational firms organize their global operations? Existing studies of this issue are premised upon at least one of two assumptions. First, foreign affiliates are established solely to manufacture a product, either for sale in the host market (à la Markusen, 1984) or for re-import (à la Helpman, 1984). Second, a firm's entry decision into a given market is independent of its actions in other locations. There is reason to believe that both assumptions obscure important features by which multinational firms organize their global operations. It is well known that not all foreign affiliates are engaged in manufacturing (see Hanson et al., 2001).[1] Nor do manufacturing affiliates sell all of their output in the host market or to the parent company. Ramondo et al. (2012) report that the average foreign manufacturing affiliate of a US MNC sells about 3/4 of its output within the host market and exports about 20% of its output to countries other than the US.[2] Where do manufacturing affiliates typically export to? According to Yeaple (2008), a majority of affiliate exports were directed to other affiliates belonging to the same parent firm in 1999. That is, most of the exports of manufacturing affiliates are conducted within the firm. Existing theories are unable to jointly reconcile these stylized facts. Consequently, they cannot inform us as to the role of wholesale affiliates in inter-affiliate trade, nor predict its effect on the geographic organization of multinational firms.

This paper examines the international expansion strategies of multinationals in the presence of third-country effects where affiliates are endogenously engaged in either manufacturing or wholesale. Using hand collected firm level data covering the foreign operations of publicly traded French multinational in 2010, I find that, ceteris paribus, a firm is more likely to establish a foreign affiliate if it operates a manufacturing affiliate in a nearby location, and the form of entry is more likely to come in the form of a wholesale affiliate than an additional manufacturing affiliate. These findings suggest that wholesale affiliates are established in close proximity to manufacturing affiliates to facilitate exports by manufacturing affiliates to third countries. Wholesale FDI is therefore a key component in the geographic organization of multinational firms which complements manufacturing FDI, rather than merely serving as a form of exporting by the parent. The notion that all affiliates engage in manufacturing is therefore likely to obscure both important aspects of multinational production, as well as the role that third countries play in shaping bilateral trade and FDI flows.

The geographic organization of French cosmetics manufacturer L'Oréal illustrates these third

[1] See also Yamawaki (1991), Head and Ries (2001), Zeile (2003) and Krautheim (2009).

[2] Ekholm et al. (2007) and Chor et al. (2008) report similar figures. Yeaple (2008) documents that the growth of sales to third countries by the foreign affiliates of US MNCs outpaced the growth of their sales in the host market from 1989-99. In 1989 sales in the host market accounted for almost 2/3 of total affiliate sales. By 1999, however, sales in the host market accounted for less than 60% of total affiliate sales (based on author's calculations of figures presented in Table 7.1 of Yeaple, 2008).

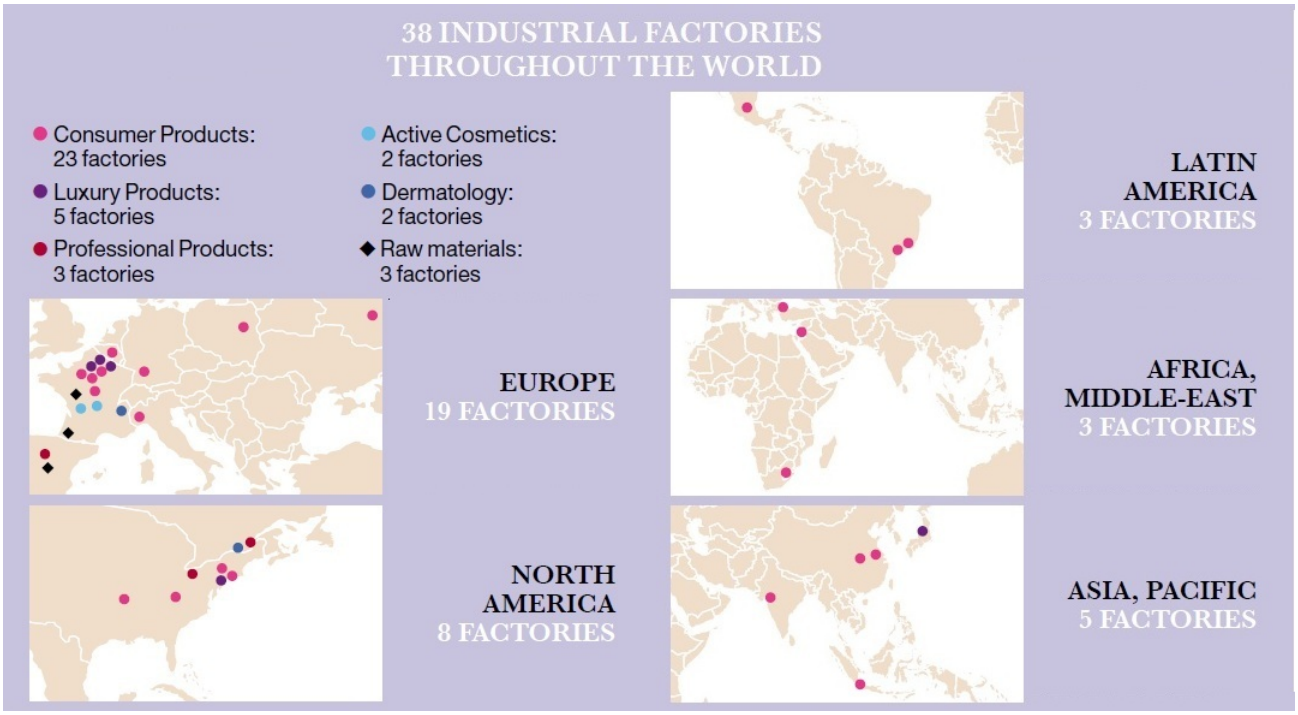


Figure 1: Production Sites of L'Oréal in 2010.

country effects and the interaction between the location choice of manufacturing and wholesale affiliates. Figure 1 presents a map of all of L'Oréal's production sites in 2010.[3] The principal assumption of theories on horizontal FDI based upon Helpman et al. (2004) is that a firm faces a choice between exporting a product from the headquarters and producing the product locally for each foreign market. Even a cursory glance at the map reveals that it need not be so. L'Oréal's manufacturing affiliates are scattered throughout the world. In most instances, therefore, there is a manufacturing affiliate that is closer to a potential market than the French parent. In addition, much of the production occurs in developing countries, where factor price differences are unlikely to play a role. If transportation costs are increasing in distance, it is cheaper to supply a wholesale affiliate in Australia from China, Indonesia or Japan that from France.[4] This demonstrates that a firm's options in a given market are not confined to local production and exports from the parent. The existence of nearby manufacturing affiliates provides a firm with additional options of supplying a wholesale affiliate. In fact, this is how L'Oréal organizes its geographic operations. In its 2010 annual financial report, L'Oréal reports that its global operations are organized around geographic clusters, each containing the necessary

[3]The figure is a modified version of the one presented on p. 75, vol. I of L'Oréal's 2010 registration document. It can be downloaded at `http://www.loreal-finance.com/_docs/us/2010-annual-report/LOREAL-2010-AR-volume1DEF.pdf`.

[4]See Head and Mayer (2012) for a review of the literature on the evidence on the role of physical distance in trade costs.

production and logistics sites necessary for the group's operations within a given region.[5]

This suggests that inter-affiliate trade can impact a firm's decision of whether to enter a nearby country and whether it is through a manufacturing or a wholesale affiliate. In Appendix A, I present case study evidence for three French multinationals that indicate the widespread prevalence of inter-affiliate trade.[6] The existence of inter-affiliate trade along with the geographic dispersion of production imply that a firm's preference for a wholesale affiliate relative to a manufacturing affiliate does not depend solely upon the characteristics of the host country but also on the characteristics of, and the firm's operations in, the geographic region.

To motivate and guide the empirical exercise, I derive a model of international expansion strategies for multinationals in a three-country model with heterogeneous multi-product firms. A firm can access a given market through one of three ways: manufacturing FDI, wholesale FDI, or arm's length exporting through an intermediary. It is assumed that there is always some form of distribution, be it within the boundary of the firm in the first two forms, or at arm's length in the third. A firm wishing to establish a manufacturing affiliate incurs relatively high fixed costs for each production facility. Each production site can produce both for the local market as well as for nearby foreign markets. Establishing a wholesale affiliate entails lower fixed costs than a manufacturing affiliate, but comes at the expense of higher variable costs, since each product sold by the affiliate must be shipped from one of the firm's production sites abroad. A third option is to export each product through an arm's length export intermediary. The intermediary bears all the variable trade costs but extracts a portion of the producer surplus due to firm-intermediary bargaining.[7]

A key feature of the model is that once a firm pays the fixed cost of establishing a wholesale affiliate and a distribution network in a given country, that affiliate can import products from any number of source countries at no additional fixed cost.[8] By contrast, the fixed cost of exporting products through an intermediary depends upon the total number of source countries. That is the case because each export intermediary is fully specialized in only a single route. This modeling approach is in keeping with the finding of Blum et al. (2010) that intermediaries import from a

[5]The company reports that its "organisational structure (is) based on major geographic poles, each of which combines all types of professional expertise, production sites and dedicated logistical centres." See p. 75, vol I of its 2010 annual report (see footnote 3 for link).

[6]The three firms are Bonduelle, Michelin, and Nexans. In many instances a manufacturing affiliate is in charge of the parent company's operations in the region, with little input from the parent. See in particular Bonduelle's operations in Eastern Europe, Michelin's operations in South America, and Nexans' operations in Scandinavia.

[7]Bernard et al. (2010b, 2011), Blum et al. (2010, 2012), and Ahn et al. (2011) provide empirical evidence that export intermediaries play a key role in facilitating exports. The choice between direct exporting and exporting through an intermediary has also been studied theoretically by Blum et al. (2012), Felbermayr and Jung (2011), Akerman (2012) and Dasgupta and Mondria (2012), among others, whereas Krautheim (2009) studies the trade-off between indirect exporting, direct exporting, and foreign production.

[8]There are however variable costs associated with shipping a product from one destination to another.

narrow range of countries.[9] Consequently, a firm that exports products from two locations to a single destination needs to match with two different intermediaries. Such a firm bears twice the fixed cost of a firm that exports products from only a single location. In equilibrium, therefore, a firm has a greater incentive to establish a wholesale affiliate in one country if it produces some of its products in a nearby destination. The benefit of establishing a production site in this country to replicate production activities that are carried out in a third countries is therefore lower.

The model generates two testable empirical predictions. Conditioning upon firm and host-country characteristics (i) the probability of a randomly observed firm entering a given market is increasing in the number of manufacturing sites operated by the firm in close geographic proximity, and (ii) the probability of a randomly observed firm establishing a manufacturing affiliate relative to establishing a wholesale affiliate is decreasing in the number of manufacturing sites operated by the firm in close geographic proximity. Importantly, these predictions arise only if the set of foreign countries are sufficiently close to each other relative to their distance from the country of the parent firm.

To test the empirical validity of these propositions, I assemble a new dataset covering the foreign activities of 110 of the largest publicly-traded French multinationals in 58 countries in 2010, generating almost 6,400 firm entry decisions. Using hand-collected data, I classify each affiliate as engaging in either manufacturing or wholesale activities. The sample comprises almost 1,800 affiliates, roughly half of which are manufacturing affiliates and half are wholesale affiliates. For each firm-country pair I construct the number of countries within a 2000 km radius that are closer to the host than is France, and in which the firm operates manufacturing affiliates.[10] I then estimate a multinomial logit firm-entry decision model, where one of three possible outcomes is observed for each firm-destination observation: (i) entry through a manufacturing affiliate, (ii) entry through a wholesale affiliate (which is chosen as the base outcome), and (iii) no affiliate. This approach enables me to exploit the large number of zeros in the data. I find that a one unit increase in the number of countries within 2000 km of the host country in which a firm operates manufacturing affiliates makes it more likely that a firm would enter a market that it otherwise would not. The probability of staying out of the market relative to entry through a wholesale affiliate falls by about 22%. At the same time, each additional manufacturing affiliate in a nearby country makes it relatively lees likely that the firm will establish another manufacturing affiliate and relatively more likely that it will establish a wholesale affiliate. At the margin, the probability of establishing a manufacturing site relative to establishing

[9] See also Bernard et al. (2011) who find that Italian intermediaries tend to export to fewer countries than comparable Italian manufacturing firms that export directly.

[10] I focus on a radius of 2000 km for the baseline specification. I also consider other radii ranging from 1500-5000 km.

a wholesale affiliate falls by 14% for each additional country within a given radius in which the firm already operates a manufacturing site. Both results are robust to the inclusion of numerous controls.

These results provide evidence that a firm's decision where to locate wholesale affiliates is influenced by the location of its manufacturing affiliates. This hypothesis is further reinforced by the finding of the effect of distance on a firm's preference for a manufacturing affiliate relative to a wholesale affiliate. Theories of multinational production assume that a firm's manufacturing affiliate location decision is driven by the proximity-concentration trade-off, that is, a firm can either produce in the local market, or it can export from the headquarters. Such theories predict that manufacturing FDI is more likely to be preferred relative to exporting in more distant markets.[11] If wholesale FDI is a means of exporting by the parent firm, then we should expect firms to prefer manufacturing FDI over wholesale FDI in markets more distant from France. The opposite is the case, however. Doubling a country's distance from France makes it 30% more likely that a firm would enter through wholesale FDI relative to manufacturing FDI. To the best of my knowledge this result has not been uncovered previously. Combined with the previous two results, it suggests that wholesale affiliates are primarily established to facilitate exports from neighboring manufacturing affiliates rather than from the parent, a finding that is at odds with the conventional view of wholesale affiliates. My findings therefore uncover an additional factor that influences the manner in which firms organize their global operations.

The economic significance of wholesale affiliates is drawing increased attention in the literature. Hanson et al. (2001) report that wholesale affiliates were responsible for nearly a quarter of the total global revenue generated by the foreign affiliates of US multinationals in 1998. The figure is even more significant for German firms as examined by Krautheim (2009). He shows that wholesale affiliates belonging to German MNCs generated about 2/3 of the revenue that manufacturing affiliates did in 2001.[12] However, papers that focus on wholesale affiliates typically regard them as simply a means of exporting from the parent to the host market and ignore the importance of third country effects.[13]

The role of third country effects in shaping FDI flows has also received significant attention. Important contributions include Baltagi et al. (2007, 2008), Blonigen et al. (2007) and Chen (2008).[14] Such papers typically use aggregate data that do not distinguish between different forms of FDI. To

[11] See Brainard (1997) and Helpman et al. (2004) for empirical evidence on the proximity-concentration trade-off

[12] This figure is based upon the author's calculations of total sales for manufacturing and wholesale affiliates across 11 sectors as provided in Table 1 of Krautheim (2009).

[13] See Yamawaki (1991) and Head and Ries (2001), who study the impact of wholesale affiliates in stimulating exports from the parent to the affiliate. Krautheim (2009) and Felbermayr and Jung (2011) also regard a wholesale affiliate as one method of exporting available to the parent firm.

[14] Head and Mayer (2004) also consider third country effects in the decision of Japanese firms to invest in Europe by looking at the role played by a host country's market potential (MP). Their measure of MP, however, is the sum of the host country's market size (i.e., its GDP) and its export platform market potential, otherwise known as its surrounding market potential (SMP). Blonigen et al. (2007) discuss as to why MP may not be a good indicator for SMP.

the best of my knowledge the only papers that study the impact of third countries on FDI using firm level data are Antràs and Foley (2011) and Chen (2011). Antràs and Foley (2011) study the impact of the ASEAN FTA on the activities of US MNCs in the region. They find that the FTA caused some MNCs to shut down existing manufacturing operations in some countries and increase export-platform sales in remaining manufacturing affiliates. My paper complements their work in three ways. First, by focusing on wholesale affiliates, I illustrate the mechanism at work by which a firm substitutes between local production and export-platform imports. Second, I confirm that their findings extend to a broader set of countries. This is not a trivial point because manufacturing affiliates located in the ASEAN countries were significantly more export-platform oriented than affiliates in other Asian countries even prior to the FTA.[15] Third, due to the small number of countries considered by their study, Antràs and Foley (2011) were unable to examine the role of host country heterogeneity, which I examine explicitly. Chen (2011) also studies the location decisions of multinationals. Using the methodology of Alfaro and Charlton (2009), Chen (2011) examines the impact of horizontal and vertical linkages of existing manufacturing sites on a firm's decision to establish a production site, be it for horizontal or vertical purposes. While contributing to the literature on vertically linked affiliates and export-platform FDI, Chen (2011) abstracts from consideration of wholesale FDI.

The rest of this paper is organized as follows. Section 2 presents the model and the main theoretical predictions. I discuss the data sources as well as the empirical strategy in section 3. Section 4 provides the estimation results, while section 5 concludes.

2 Theory

Consider a world composed of three countries: a source country s as well as two foreign countries i and j. Countries are indexed by n where need be. Since the focus of this paper is on export-platform FDI, I assume that countries i and j are closer to each other than to the source country. For simplicity, I further assume that the two foreign countries are equidistant from country s. The distance between s and either foreign market is denoted by $\tau > 1$, and the distance between i and j is denoted by $t \in (1, \tau)$. The focus of the model is on the actions of firms headquartered in country s. Firms headquartered elsewhere are treated as passive actors.

[15] In 1989 (prior to the FTA) manufacturing affiliates of US MNCs located in the ASEAN countries exported 28% of their output to third countries, while selling only 46% of their output domestically. The corresponding figures for affiliates in other Asian countries were 13% and 79%, respectively. See Table 4 in their paper. The authors do caution that their findings "may not be representative" of the activities of MNCs in other regions.

2.1 Preferences

Each economy is composed of L identical workers with a single unit of time. All workers supply labor inelastically and derive utility from consuming varieties produced in $H+1$ sectors. The utility function is

$$Q_n = q_0^{\mu_0} \prod_{h=1}^{H} \left[\int_{\omega \in \Omega_{n_h}} q_{n_h}(\omega)^{\frac{\sigma_h - 1}{\sigma_h}} d\omega \right]^{\mu_h \frac{\sigma_h}{\sigma_h - 1}} \quad \text{where} \quad \mu_0 + \sum_{h=1}^{H} \mu_h = 1.$$

Each sector $h \in H$ is composed of firms producing differentiated varieties and engaging in monopolistic competition. Consumer demand for a differentiated variety ω in sector h in market n is $q_{n_h}(\omega) = \mu_h Y_n P_{n_h}^{\sigma-1} p_{n_h}(\omega)^{-\sigma}$. Y_n is country n's total income and P_{n_h} is the sectoral price index and is defined as $P_{n_h} = \left(\int_{\omega_{n_h} \in \Omega_{n_h}} p_{n_h}(\omega)^{1-\sigma_h} d\omega \right)^{\frac{1}{1-\sigma_h}}$. Ω_{n_h} is the set of varieties available in market n. To simplify notation let $\hat{A}_{n_h} = \mu_h Y_n P_{n_h}^{\sigma-1}$ be the demand shifter faced by all firms serving sector h in country n. Given that I do not model the actions of firms headquartered in i and j, $\hat{A}_n$ is exogenous for both countries. It is further assumed that $\hat{A}_{jh} > \hat{A}_{ih}\ \forall h$. Country j is therefore the more lucrative of the two foreign markets for each industry h. Henceforward the industry subscript h is suppressed where it is not necessary.

The homogeneous good sector 0 is comprised of a large number of identical firms that require one unit of labor in order to produce a unit of output. Workers employed in this sector receive a wage equal to the price of the good. The homogeneous good is shipped at no cost across national boundaries. Consequently, its price is identical throughout the world, and is normalized to one. Workers are fully mobile across sectors within a country. Wages are therefore equalized across sectors within a country, which also implies that wages are identical across countries and are equal to one.[16] L is assumed to be sufficiently large to ensure positive production of the homogeneous good in each country.

2.2 Production

To direct attention to the influence that foreign affiliates have on a firm's logistics and organization decision I focus on multi-product firms. This is a reasonable approach since most multinationals are also multi-product firms.[17] Each firm that operates in a differentiated products sector has the

[16] The use of an outside homogeneous good to pin-down wages is standard in models of international trade. See Helpman et al. (2004), Irarrazabal et al. (2012) and Keller and Yeaple (2012) among others.

[17] It is well known that very few firms engage in multinational activity, yet those that do account for a significant share of total output and trade flows (US MNCs account for over 90% of US exports and imports, see Bernard et al., 2009). It is also well known that multi-product firms represent a small subset of active firms yet generate a significant share of total output (almost 90% of total manufactured output in the US in 1997, see Bernard et al., 2010a). Consequently, most multinationals are also multi-product firms.

property rights to two varieties. Varieties are indexed by $v \in \{1, 2\}$, with variety 1 being the firm's core variety.[18] As in Melitz (2003), firms are heterogeneous with respect to their productivity level, which is denoted by $\bar{\phi}$. A firm with a productivity level of $\bar{\phi}$ produces variety v with an effective productivity level of

$$\bar{\phi}(v) = \begin{cases} \bar{\phi} & \text{if } v = 1, \\ \beta\bar{\phi} & \text{if } v = 2. \end{cases}$$

It is assumed that $\beta < 1$ so that the firm is less efficient in producing its non-core product. This closely resembles the modeling approach of Arkolakis and Muendler (2011) and also Eckel and Egger (2010) and Mayer et al. (2011).[19] As in Arkolakis and Muendler (2011) the elasticity of substitution between two varieties is the same irrespective of whether the varieties are produced by the same firm or by two different firms.[20]

In order to produce a unit of output for any variety v, the firm needs to perform two tasks. Each task requires labor as the sole factor of production in the following manner:

$$q(v) = \bar{\phi}(v) z_1^{\alpha} z_2^{1-\alpha}. \tag{1}$$

z_1 and z_2 denote the amount of labor employed in the performance of each task.[21] As in Irarrazabal et al. (2012) the first task must be performed at the headquarters, whereas the second task may be performed in any manufacturing site. This modeling approach can be justified on the grounds that the task performed at the headquarters corresponds to headquarter services and cannot be replicated abroad.[22] Given the production structure, the marginal cost for domestic operations is $C_s(v) = \frac{1}{\phi(v)}$ where $\phi(v) = \frac{\bar{\phi}(v)}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}$ is a transformed measure of productivity. Henceforward I will refer to ϕ as the firm's productivity.

[18] It is possible to extend the model to the case where a firm can produce multiple varieties. Doing so would increase the complexity of the model without adding additional insight.

[19] Iacovone and Javorcik (2008), Arkolakis and Munedler (2011) and Mayer et al. (2011) present evidence that firms have core competencies in some of their varieties and are less efficient in producing their non-core varieties.

[20] I thereby rule out the cannibalization effect that would otherwise exist between varieties produced by the same firm. See Baldwin and Ottaviano (2001) for a model with the cannibalization effect and multinational production.

[21] Labor productivity varies only at the firm level for each task and is the same across all countries.

[22] This approach is similar to Keller and Yeaple (2012) who present a model where production requires the completion of a continuum of tasks that vary in terms of the coordination cost between the headquarters and the affiliate. As in the present setting some of the tasks will be conducted at the headquarters with the remainder being conducted by the manufacturing affiliate.

2.3 Means of serving foreign markets

A firm headquartered in s and active in any differentiated goods sector h can serve either foreign market through one of three ways: manufacturing FDI, wholesale FDI, or exporting through an arm's-length intermediary. Each approach results in different fixed and variable costs, thereby generating different profit streams. Irrespective of how a firm chooses to serve either foreign market it is assumed that both products will be produced domestically. Vertical FDI is thereby ruled out.

2.3.1 Manufacturing FDI

A firm that does not own any production sites in country n incurs a fixed cost of F_{mw} units of output to establish its first manufacturing site, regardless of which variety the site is used to produce.[23] Each plant can be used to produce only one variety. The fixed cost of establishing the first plant incorporates the cost of establishing a distribution network that enables the firm to import and distribute a second good at no additional fixed cost. A firm that has one production site in a foreign country wishing to establish a second one incurs a fixed cost of $F_m < F_{mw}$. F_m denotes the cost of building a plant whereas F_{mw} denotes the cost of building a plant and a distribution network. Thus, whereas a firm needs two plants to produce two goods, a single distribution network is sufficient to distribute both products within a country.

Multinational production is also associated with variable trade costs due to headquarter services in production (see equation (1)). Shipping the input z_1 is subject to iceberg trade costs. As in Garetto (2010), Irarrazabal et al. (2012) and Keller and Yeaple (2012) the intermediate is shipped from the parent to the affiliate at marginal cost.[24] This establishes an inverse relationship between affiliate production and trade costs. Such a modeling approach is consistent with the consensus within the literature that production costs of manufacturing affiliates are increasing in their distance from the parent (see Yeaple, 2009). Intermediates imported from the parent are partly responsible for this. Hanson et al. (2005) report that intermediates supplied by the parent account for 11% of the total production cost of the average foreign manufacturing affiliate of US MNCs for 1994. Ramondo et al. (2012) report an average figure of 8% for 1999, though the amount is greater for larger firms. Though a figure of 8-11% may not seem overly large, Keller and Yeaple (2012) find that the tasks performed by the headquarters are typically the moore knowledge-intensive ones, which are hard to replicate especially in distant affiliates.

[23] All fixed costs are paid in units of final output. I further assume that all fixed costs are the same for all countries.

[24] The assumption in the first two papers is based upon the findings of Bernard et al. (2006) and Neiman (2010) regarding the differences between the prices of goods shipped within the boundary of the firm and those that are shipped at arm's length.

Given the above discussion, the marginal cost function for a manufacturing affiliate in country n producing variety v is

$$C_{m_n}(v) = \frac{\tau^\alpha}{\phi(v)}. \tag{2}$$

Variable profits from manufacturing FDI in country n for variety v are $\pi^o_{m_n}(v) = A_n \left(C_{m_n}(v)\right)^{1-\sigma}$, where $A_n = (1/\sigma)\hat{A}_n \left[(\sigma-1)/\sigma\right]^{\sigma-1}$. Aggregate variable manufacturing FDI profits in country n are $\Pi^o_{m_n} = \sum_v I_{m_n(v)} A \left(C_{m_n}(v)\right)^{1-\sigma}$, where $I_{m_n(v)}$ is an indicator variable that takes on the value of 1 if the firm produces variety v in the country.

2.3.2 Wholesale FDI

A second option available to a firm is to establish a wholesale affiliate instead of a manufacturing affiliate. Doing so incurs a fixed cost of $F_w < F_m$, which is the cost of establishing a distribution network.[25] Once established, the affiliate can import products from any number of locations at no additional fixed cost. Such a modeling approach is consistent with the findings of Arkolkais and Muendler (2011), who note that the per-variety fixed costs are diminishing for each successive variety that a firm introduces into the market.[26] Importing either variety is subject to variable trade costs, however. A firm with a wholesale affiliate in country n will supply each product to the affiliate from the site that can do so at the lowest marginal cost. The marginal cost of supplying product v from the headquarters is

$$C^s_{w_n}(v) = \frac{\tau}{\phi(v)}. \tag{3}$$

The marginal cost of supplying product v from a production site in country n' to country n is

$$C^{m_{n'}}_{w_n}(v) = tC_{m_{n'}}(v) \quad \text{with} \quad C_{m_{n'}}(v) = \frac{\tau^\alpha}{\phi(v)}. \tag{4}$$

Although $t < \tau$, $C^{m_{n'}}_{w_n}(v)$ is not necessarily lower than $C^s_{w_n}(v)$. Such is the case because the manufacturing affiliate in n' is reliant upon intermediates imported from the parent. Hence, if t is sufficiently large, a firm will prefer to supply n directly from the headquarters. I will return to this point in section 2.4.

The above discussion makes it clear that profits earned from wholesale affiliate operations depend

[25] It is assumed that $F_{mw} = F_m + F_w$.

[26] One approach to think about this is to consider the fee F_w as corresponding to the cost of penetrating the market and establishing the firm's brand reputation. Once that is accomplished for the firm's core product, the firm can parlay its brand name status towards introducing its other products into the market at a significantly lower cost. This is confirmed by a recent survey of senior corporate executives by the public relations firm Weber Shandwick that found that the reputation of the parent firm has a strong impact on the performance of individual brands. See `http://www.webershandwick.eu/home/news/673`.

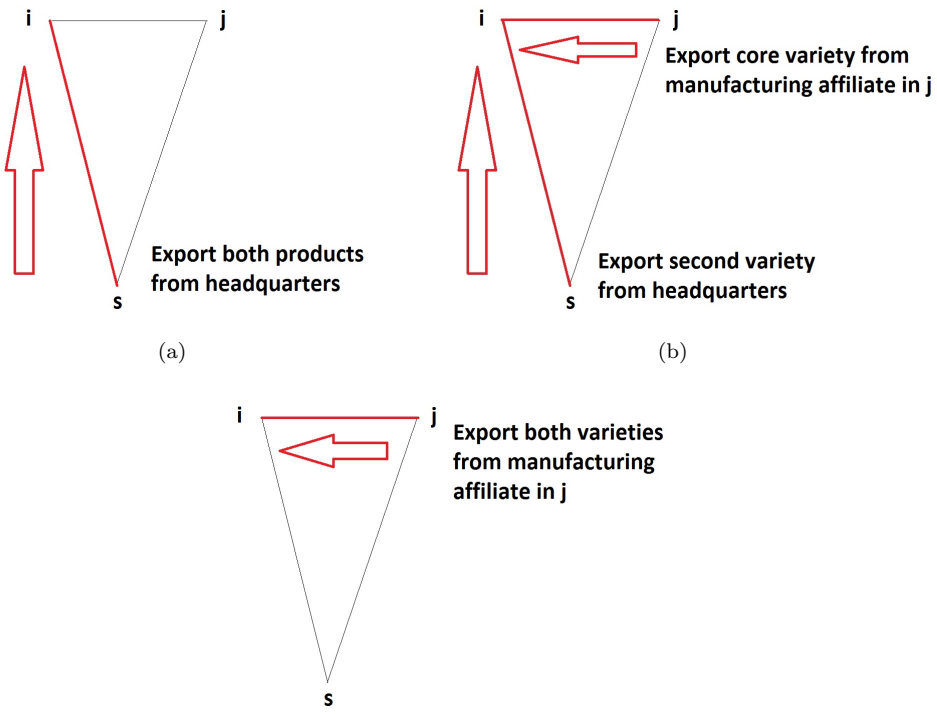


Figure 2: Logistical Options for Serving a Wholesale Affiliate in Country i

upon the source of production for each product. The logistical organization in turn depends on whether the firm has a manufacturing affiliate in a nearby country. Figure 2 displays three potential logistical arrangements. Consider first a firm that does not own a manufacturing affiliate j.[27] Such a firm will supply both products to country i from the headquarters. A firm that owns a manufacturing affiliate in j which produces the firm's core variety can supply the core variety from j and the secondary variety from i.[28] Lastly, a firm that produces both products in j can export both of them from j to i.[29]

The above figure demonstrates the potential logistical arrangements for three different types of firms: those that do not own nearby manufacturing affiliate, those that produce only the core variety in a nearby affiliate, and those that produce both varieties in a nearby affiliate. Wholesale FDI profits

[27] Or, correspondingly, a firm that does own a manufacturing affiliate in j but for which $C^s_{w_i} < C^{m_j}_{w_i}$.
[28] Assuming that $C^s_{w_i} < C^{m_j}_{w_i}$. Otherwise, the option depicted in panel (a) will be chosen in equilibrium.
[29] See previous footnote.

can therefore take on one of three forms, depending upon the relative sizes of t and τ :

$$\Pi_{w_n} = -F_w + \begin{cases} (i) \;\; A \times \sum_v \left(C^s_{w_n}(v)\right)^{1-\sigma} & \text{if firm has no production sites in } n', \\ (ii) \;\; \underbrace{A \times \max\left\{\left(C^s_{w_n}\right)^{1-\sigma}, \left(C^{m_{n'}}_{w_n}\right)^{1-\sigma}\right\}}_{\text{Profits from core variety}} & \\ \quad + \;\; \underbrace{A\left(C^s_{w_n}(2)\right)^{1-\sigma}}_{\text{Profits from second variety}} & \text{if firm produces core variety in } n', \\ (iii) \;\; A \times \sum_v \max\left\{\left(C^s_{w_n}(v)\right)^{1-\sigma}, \left(C^{m_{n'}}_{w_n}(v)\right)^{1-\sigma}\right\} & \text{if firm produces both varieties in } n', \end{cases} \tag{5}$$

The middle option depicts the decision facing a firm that produces its core variety in n'. It can use this production site to also supply country n, or it can supply country n from the headquarters. Irrespective of the option chosen, the second variety will be shipped from the headquarters since that is the only place in which it is produced. A firm with two production sites in n' faces this trade-off for both varieties, and will ship both varieties from the same location. It will thus adopt either the logistical option depicted in panel (a) or the one depicted in panel (c) of Figure 2.

2.3.3 Exporting Through an Intermediary

A third option available to a firm wishing to access a foreign market is to export either or both varieties through an intermediary. There exists an exogenous mass of identical export intermediaries in each country. Each intermediary can be retained to export as many products as a firm wishes to. However, each intermediary specializes in only a single route. That is, an intermediary can deliver products only between one pair of countries, i.e., either (i, j), (i, s), or (j, s). A different intermediary must therefore be contracted for each production source-destination country pair. This is in keeping with the evidence that export intermediaries tend to serve a small set of countries.[30] As in Antràs and Costinot (2011) a firm must pay a search cost in order to match with a single intermediary. This cost corresponds to the cost of searching for a suitable exporter for a given market, and is denoted by $F_x < F_w$.

The total fixed cost from exporting to country n at arm's length therefore depends upon the number of divisions of the MNC that are involved. Sticking with L'Oréal as our example, suppose that L'Oréal did not have a wholesale affiliate in Australia and wished to supply dermatological products and/or active cosmetics. Supplying both from France requires matching with a single intermediary, which incurs the fixed cost F_x. However, if L'Oréal were to supply dermatological products from

[30] See Blum et al. (2010) and Bernard et al. (2011) for evidence.

Japan and active cosmetics from France, then each branch of the MNC would have to match with a single intermediary, as it is unlikely that an intermediary specializing in the route Australia-France would also specialize in the route Australia-Japan given the findings of Blum et al. (2010). The total fixed cost incurred by L'Oréal would then be $2F_x$. Hence, if all exports originate from a single location, only one intermediary is retained. By contrast, if each product is exported from a different location, two intermediaries must be retained. The possible values for the total fixed cost paid are

$$\text{Total fixed cost} = \begin{cases} F_x & \text{if export varieties from same production site,} \\ 2F_x & \text{if export varieties from two different production sites.} \end{cases}$$

Upon matching, the firm and the intermediary bargain over the purchase price. Once an agreement is reached the intermediary delivers the product to the foreign market bearing all of the transportation costs associated with it. To derive the price at which the intermediary purchases a product from the producer I begin with the final step in the process. I focus on the case where the intermediary bargains with the headquarters. The outcome for the case where it bargains with an affiliate is analogously defined with τ replaced by t. Suppose that the intermediary has purchased q units of output at a price of p_x. Its total variable cost is thus qp_x. Due to iceberg trade costs, a fraction $1/\tau$ of the q units purchased are lost in transit, so that only $q_a = q/\tau$ units remain. The intermediary's revenues are $p_a q_a$, with p_a being the price that the intermediary charges foreign consumers for the product. p_a is chosen to maximize the intermediary's per-variety profits:

$$p_a = \arg\max_{p_a} \left\{ \hat{A} p_a^{-\sigma} \left(p_a - \tau p_x \right) \right\},$$

with all country subscripts being suppressed for ease of notation. The optimal retail price is therefore $p_a = \tau p_x \frac{\sigma}{\sigma - 1}$. The agent's operating profits from selling the firm's product in the foreign market are $\pi_a = A \left(\tau p_x \right)^{1-\sigma}$.

Both parties are forward looking and anticipate this outcome when negotiating the price at which the intermediary purchases q units of output from the firm. Following Antràs and Costinot (2011), I assume that the outcome is determined through Nash Bargaining. With equal weights for both parties, the negotiated price solves the following problem:

$$p_x = \arg\max_{p_x} \left[\tau \hat{A} p_a^{-\sigma} \left(p_x - C \right) \right]^{\frac{1}{2}} \left[A \left(\tau p_x \right)^{1-\sigma} \right]^{\frac{1}{2}}.^{31}$$

$C \in \left\{C_s, C_{m_{n'}}\right\}$ is the marginal cost of producing the final good depending upon the source of production.[32] This reflects the fact that a manufacturing affiliate may also export through an intermediary.

Solving the Nash Bargaining problem gives us the price $p_x = \frac{2\sigma-1}{2(\sigma-1)}C < \frac{\sigma}{\sigma-1}C$. Although p_x does not depend upon trade costs, an increase in τ lowers the quantity of output that the intermediary is willing to purchase from the firm at a given price level. Notice also that exporting through a third party forces the firm to lower its markup below the standard CES level. Hence, while this mode of exporting is attractive due to lower fixed and marginal costs, it comes at the expense of a lower price-cost margin.

Substituting the price p_x into the firm's profit function enables us to express variable profits from exporting variety v via an intermediary to country n as

$$\pi_{x_n}(v) = \psi A_n \left(\tau C(v)\right)^{1-\sigma}. \tag{6}$$

The term $\psi = \frac{1}{2}\left(\frac{2(\sigma-1)}{2\sigma-1}\right)^{\sigma} \leq \frac{1}{2}$ reflects the fact that the firm retains only a fraction of the total surplus when it chooses to export through a third-party. The decline in the firm's share is due to the search frictions which allows the intermediary to charge its own markup over the price paid to the firm. A higher retail price lowers consumer demand for the firm's product. The firm is thereby forced to lower the producer's markup in order to reduce the price charged by the intermediary. Since the producer's and the intermediary's markup are falling in σ, so is the share of the surplus that is extracted by the export intermediary. Hence, the firm's per-product share is greater in industries with lower markups, i.e., $\partial\psi/\partial\sigma > 0$. This feature of the model yield results similar to the double-marginalization approach of Akerman (2012). Both imply that indirect exporting is most disadvantageous in industries characterized by higher markups.

A firm with multiple production sites can supply each variety to country n from either site. Arm's

[31] The two parties are assumed to have equal bargaining weights in order to avoid introducing an additional parameter. Allowing the bargaining weights to differ would simply re-scale some of the results by the parameter chosen to denote the bargaining weight without altering any of the fundamental results. See Helpman et al. (2010) as an example where the authors also assume equal bargaining weights for the parties engaged in the bargaining process.

[32] C is not necessarily equal to $\min\left\{C_s, C_{m_{n'}}\right\}$ as will soon be made clear.

length exporting profits therefore depend upon the number of sites the firm exports from:

$$\Pi_{x_n} = -F_x + \begin{cases} (i) \;\; \psi A_n \times \sum_v \left(C^s_{x_n}(v)\right)^{1-\sigma} & \text{if firm has no production sites in } n', \\ (ii) \;\; \psi A_n \times \sum_v \max\left\{\left(C^s_{x_n}(v)\right)^{1-\sigma}, \left(C^{m_{n'}}_{x_n}(v)\right)^{1-\sigma}\right\}, & \text{if firm produces both products in } n', \\ (iii) \;\; \max\left\{ \underbrace{\psi A_n \sum_v \left(C^s_{x_n}(v)\right)^{1-\sigma}}_{\text{Export both products from } s}, \underbrace{\psi A_n C^{m_{n'}}_{x_n}(1)}_{\text{Export only core variety from } n'}, \right. & \\ \left. \underbrace{\psi A_n \left(C^{m_{n'}}_{x_n}(1)\right)^{1-\sigma} + \psi A_n \left(C^s_{x_n}(2)\right)^{1-\sigma} - F_x}_{\text{Export core variety from } n' \text{ and second variety from } s} \right\} & \text{if firm produces only core variety in } n'. \end{cases} \tag{7}$$

The final term reflects the additional variable cost-fixed cost trade-off facing the firm. Even if $C^{m_{n'}}_{x_n} < C^s_{x_n}$, a firm may nevertheless prefer to supply both products from the headquarters in order to avoid paying the additional intermediary matching cost of F_x. Conversely, a firm in such a situation may choose to supply only its core product from n'. This is the second term in the max operator for option (iii). Firms choosing that option are single-product exporters. By contrast, firms operating wholesale affiliates always export both of their products.

The foregoing discussion establishes the importance of multi-product firms. In a single-product firm setting a multinational firm that wishes to export through an intermediary would always do so from the location with the lowest variable cost, since the fixed cost is unchanged. In the presence of multi-product firms the trade-off between arms-length exporting and exporting to a wholesale affiliate in n is different for a firm with a manufacturing site in n' and for one without. This is particularly true if a multinational does not produce all of its products in the same location. Such is indeed the case for L'Oréal, as is evident from Figure 1. L'Oréal is not alone in producing different products in different locations. For example, the interested reader can refer to the 2010 annual financial report of French car manufacturer Peugeot, which lists the firm's production locations as well as the products produced in each location.[33] The pattern resembles that of L'Oréal.

2.3.4 Summary of Production Options

Before deriving the equilibrium of the model it is useful to consider all the possible ways in which a firm can access market n. Table 1 presents the complete menu of options. Each cell presents the possible source of production for a particular variety given a particular form of serving the market. A firm can engage in manufacturing FDI in country n in either or both products, it can establish a

[33]The 2010 annual report can be downloaded at `http://www.psa-peugeot-citroen.com/en/finance/regulated-information/annual-financial-reports/2010`. A full listing of its production sites as well as what each site produces is provided on pp. 92-4.

wholesale affiliate or it can export at arm's length. A firm choosing either of the latter two options also has a choice as to where to supply each product from. In total, each firm has 13 possible options for accessing consumers in a particular country. Not all of these will exist in equilibrium, however.

Table 1: Possible Means of Organizing Production to Access Market n

Option (#)	Arm's Length Exporting		Wholesale FDI		Manufacturing FDI	
	Variety		Variety		Variety	
	(1)	(2)	(1)	(2)	(1)	(2)
	Source of Production					
1)	s	s	-	-	-	-
2)	s	n'	-	-	-	-
3)	n'	s	-	-	-	-
4)	n'	n'	-	-	-	-
5)	-	-	s	s	-	-
6)	-	-	s	n'	-	-
7)	-	-	n'	s	-	-
8)	-	-	n'	n'	-	-
9)	-	-	s	-	n	-
10)	-	-	-	s	-	n
11)	-	-	n'	-	n	-
12)	-	-	-	n'	-	n
13)	-	-	-	-	n	n

2.4 The Logistical Organization of the Firm

While countries i and j are closer to each other than either one is to s, it is possible that a multinational firm with a production site in one of the countries would choose not to use it as an export platform. Such is the case because manufacturing affiliates are reliant upon intermediate inputs imported from the parent. Hence, it is cheaper to supply any market n from s than from a production site in n' if t is large relative to τ. Consider the profit function from wholesale affiliate operations for a firm with one foreign production site (see the middle section of equation (6)). A firm is indifferent between supplying its core variety to n from s and from its production site in n' if $C^s_{w_n} = C^{m_{n'}}_{w_n}$, or if

$$t = \tau^{1-\alpha}. \tag{8}$$

Since $\alpha > 0$, it is possible that $C^s_{w_n} < C^{m_{n'}}_{w_n}$ if countries i and j are too distant from each other relative to their distance from s.

Proposition 1: *In an equilibrium in which firms maximize profits, labor markets clear, and the demand shifters are exogenously given, a firm with a production site in n' will use it to supply a*

wholesale affiliate in a nearby market n only if countries n and n' are close enough to each other relative to their distance from s.[34]

Proposition 1 indicates that the manner in which the firm organizes its global operations varies depending upon whether export-platform FDI is feasible. Therefore, there exist two types of configurations, both of which will be examined.

2.4.1 Equilibrium with relatively distant foreign countries

Export-platform affiliate sales are unprofitable when the two foreign countries are too far from each other. In that case, the equilibrium of the model resembles the one in Helpman et al. (2004), in which a firm's entry decision into each market is made separately and independent of its actions elsewhere. Consequently, a firm has four potential options for delivering its products to each foreign market. They are depicted in Table 2. A firm can either export both of its products through an intermediary, establish a wholesale affiliate, or establish a manufacturing affiliate. A firm choosing the latter course would still need to decide as to whether the manufacturing affiliate should produce both of its products or only the core variety. A firm choosing the latter option would import the second variety from the parent.

Table 2: Organization of Production in Equilibrium with Distant Foreign Countries

Option #	Arm's Length Exporting		Wholesale FDI		Manufacturing FDI	
	Variety		Variety		Variety	
	(1)	(2)	(1)	(2)	(1)	(2)
	Location of Production					
1)	s	s	-	-	-	-
2)	-	-	s	s	-	-
3)	-	-	-	s	n	-
4)	-	-	-	-	n	n

Due to fixed costs of matching with an intermediary, not all firms will serve every foreign market. Since each intermediary can be hired to export any number of products at no additional cost, those firms that do export through an intermediary will export both of their products. A firm exporting to country n earns profits of $\Pi_{x_n}(\phi) = \psi A_n \left(\frac{\phi}{\tau}\right)^{\sigma-1} \left(1+\beta^{\sigma-1}\right) - F_x$. Only those firms whose variable profits at least match the fixed cost of F_x will export. The productivity threshold for doing so is denoted by Φ_{x_n}, which is the solution to $\Pi_{x_n}(\Phi_{x_n}) = F_x$.

[34]The situation pertaining to using n' as a platform to export to n through an intermediary is slightly different as will be discussed below.

An alternative to this approach is to establish a wholesale affiliate and export directly. Profits from wholesale FDI in country n are $\Pi_{w_n}(\phi) = A_n \left(\frac{\phi}{\tau}\right)^{\sigma-1} \left(1+\beta^{\sigma-1}\right) - F_w$. Wholesale FDI is a realistic option only for those firms that earn greater profits from it than from exporting through an intermediary. The productivity threshold for wholesale FDI is Φ_{w_n}, which is the productivity level at which $\Pi_{w_n}(\Phi_{w_n}) = \Pi_{x_n}(\Phi_{w_n})$.

Unlike the trade-off between arm's-length exporting and wholesale FDI, the trade-off between manufacturing and wholesale FDI is made at the variety level. Recall from section 2.3 that the fixed cost of establishing a production site F_{mw} incorporates the cost of establishing a distribution network. Hence, firms that produce only their core variety in country n can also distribute the secondary variety at no additional fixed cost. As is well known, when preferences are CES a firm will supply a product irrespective of the variable cost provided that there are no added fixed costs.[35] A firm prefers wholesale FDI to manufacturing FDI for its core variety as long as the profits from the former outweigh the latter. Such is the case for all firms whose productivity level is below Φ_{m_n}, which is the solution to $A_n \left(\frac{\Phi_{m_n}}{\tau^\alpha}\right)^{\sigma-1} - F_{mw} = A_n \left(\frac{\Phi_{m_n}}{\tau}\right)^{\sigma-1} - F_w$.

Firms that produce only their core variety in country n will import their second variety from the headquarters, an organizational form that resembles the one examined by Yeaple (2012) where multi-product multinationals export some of their products to countries in which they operate manufacturing affiliates. This approach will be chosen only by firms for whom the added sales from an additional production site are insufficient to cover the added fixed cost, i.e., for whom $A_n \left(\beta \frac{\phi}{\tau^\alpha}\right)^{\sigma-1} - F_m < A_n \left(\beta \frac{\phi}{\tau}\right)^{\sigma-1}$. Only firms with a productivity level at least as high as $\Phi_{m_n(2)}$ will produce both of their products in country n.

Table 3: Summary of Productivity Cut-offs with Distant Foreign Countries

Productivity Cut-off	Expression
Φ_{x_n}	$\tau \left[\frac{F_x}{\psi A_n (1+\beta^{\sigma-1})}\right]^{\frac{1}{\sigma-1}}$
Φ_{w_n}	$\tau \left[\frac{F_w - F_x}{(1-\psi) A_n (1+\beta^{\sigma-1})}\right]^{\frac{1}{\sigma-1}}$
Φ_{m_n}	$\tau \left[\frac{F_{mw} - F_w}{A_n (T-1)}\right]^{\frac{1}{\sigma-1}}$
$\Phi_{m_n(2)}$	$\frac{\tau}{\beta} \left[\frac{F_m}{A_n (T-1)}\right]^{\frac{1}{\sigma-1}}$

Table 3 presents expressions for all four productivity thresholds. All four cut-offs exist provided that the pecking order $\Phi_{x_n} < \Phi_{w_n} < \Phi_{m_n} < \Phi_{m_n(2)}$ is satisfied. Such is the case when the fixed costs

[35] Such is the case because consumer demand for any product is always positive at any finite price level with CES preferences.

and variable trade costs obey the following

$$\frac{1}{\psi}F_x < F_w < \left[\frac{(1-\psi)\left(1+\beta^{\sigma-1}\right)}{T-1}\right]F_m + F_x, \tag{9}$$

with $T = \tau^{(1-\alpha)(\sigma-1)}$.

2.4.2 Equilibrium with nearby foreign countries

Firms decide to use manufacturing affiliates as an export platform only if $t < \tau^{1-\alpha}$. Entry into one country therefore affects a firm's entry decision into the neighboring country. It has already been assumed that country j has a larger market. In order to minimize the number of potential equilibrium outcomes and to illustrate clearly the mechanisms of the model, I further assume that

$$\frac{A_j}{A_i} \in F_m \frac{1+\beta^{\sigma-1}}{T-1} \times \left(\frac{1-\psi}{F_w - F_x}, \frac{\psi}{F_x}\right). \tag{10}$$

Given equation (10), no firm will find it profitable to establish a wholesale affiliate in the smaller market i without first having a manufacturing affiliate in the larger market j. The export, wholesale FDI, and manufacturing FDI cut-offs for country j are as defined in Table 3 with the subscript n replaced by j where applicable. Moreover, the productivity cut-off for exporting to country i is also unchanged.

Consider now the behavior of firms that have a manufacturing affiliate in country j but that do not find it profitable to establish a wholesale affiliate in country i. Under equation (10), such firms do find it profitable to export through an intermediary. Of interest is the comparison of the behavior of exporting firms that do own a production site in country j with those that do not. The former set have three options: (i) export the core variety from j and the second variety from s, (ii) export only the core variety from j, and (iii) export both varieties from s. The fixed cost from the first approach is $2F_x$, whereas the fixed cost from the latter two approaches is F_x. Consequently, the least productive among this cohort will not choose the first option. Moreover, since the fixed cost from options (ii) and (iii) is identical, the two cannot co-exist in equilibrium. It can be shown that option (ii) is strictly preferred to option (iii) by all firms if

$$t < \frac{\tau^{1-\alpha}}{\left(1+\beta^{\sigma-1}\right)^{\frac{1}{\sigma-1}}}. \tag{11}$$

Although it assumed that $t < \tau^{1-\alpha}$, equation (11) is not guaranteed to hold because $\left(1+\beta^{\sigma-1}\right)^{\frac{1}{\sigma-1}} >$

1. The key determinant as to whether (11) holds is the size of $\left(1+\beta^{\sigma-1}\right)^{\frac{1}{\sigma-1}}$, which is decreasing in σ. The inequality is therefore more likely to hold when σ is high.

Using the manufacturing affiliate in j to supply only the firm's core variety to country i would enable the firm to sell a larger amount of the core product to the export intermediary at a given price than it otherwise would be able to do if it were to export from the headquarters.[36] The downside from this approach is that the firm would only be able to sell one product. This is an appealing strategy only when trade cost considerations are relatively more important, which is the case when the surplus extracted by the intermediary is not too large relative to transportation costs. As has already been noted, however, the share extracted by the intermediary is larger in industries with greater product differentiation (see section 2.3.3). Firms operating in such industries are relatively more concerned with the share they retain than with transportation costs. Hence, they prefer to export both products from the headquarters, as the profit generated by the second product more than offsets the reduction in the quantity sold of the core variety. This demonstrates that even when the marginal cost of export-platform affiliate sales is lower than the marginal cost of exporting from the headquarters, some firms may nevertheless forgo export-platform sales.

Proposition 2: *In an equilibrium in which firms maximize profits, labor markets clear, and the demand shifters are exogenously given, $t < \tau^{1-\alpha}$ is not a sufficient condition for a firm to use a nearby manufacturing affiliate as an export platform. Instead, there exist combinations of t and τ at which a firm would prefer to export from the headquarters. This is more likely to occur in industries with greater product differentiation.*

Figure 3 depicts the logistical options chosen in equilibrium when equation (11) holds. Firms with $\phi \in \left(\Phi_{m_{x_i}}, \Phi_{m_j}\right)$ have no alternative to exporting from the headquarters. The least productive firms that are able to establish a manufacturing affiliate in j, i.e., those firms whose productivity level ϕ lies in the range $\left(\Phi_{m_j}, \Phi_{x_i(2)}\right)$, cease exporting from the headquarters. Instead, this set of firms prefer to export only the core variety from the manufacturing affiliate in j. The next most productive cohort — those firms with a productivity level $\phi \in \left(\Phi_{x_i(2)}, \Phi_{w_i}\right)$ — find it profitable to hire two different export intermediaries. This set of firms prefer to export the core variety from the manufacturing affiliate in j and the second variety from s. Lastly, firms with $\phi \geq \Phi_{w_i}$ find it profitable to establish a wholesale affiliate in country i.

[36] Recall from section 2.3.3 that the price paid by the intermediary is invariant to trade costs, but the amount purchased is falling in trade costs.

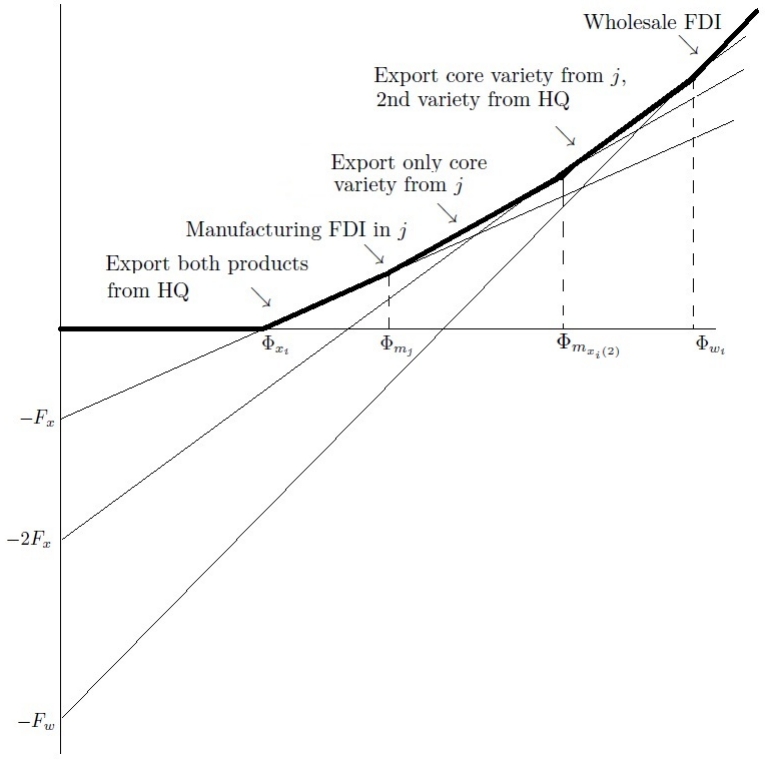


Figure 3: Logistical Options when a Manufacturing Affiliate is Always Used as an Export Platform

When equation (11) does not hold, all firms that export through an intermediary will always export both products. That is the case because firms will always prefer to export both products rather than just the core variety. The set of feasible logistical options that will exist in an equilibrium in which equation (11) does not hold are depicted in Figure 4. The main difference between Figures 3 and 4 is the reaction of firms whose productivity level is just slightly greater than Φ_{m_j}. When $t > \frac{\tau^{1-\alpha}}{(1+\beta^{\sigma-1})^{\frac{1}{\sigma-1}}}$, some of the least productive firms that own a manufacturing affiliate in j will not use it as an export platform. Instead, they will continue to export both of their products from the headquarters in s. Only firms whose productivity level is at least as great as Φ_{mx_i} will find it profitable to incur the additional fixed cost of F_x in order to export the core variety from country j.

As intimated by Figures 3 and 4, the wholesale FDI productivity cut-off in country i is independent of whether equation (11) holds provided that $\Phi_{w_i} > \max\left\{\Phi_{x_i(2)}, \Phi_{mx_i}\right\}$.[37] As was the case when $t >$

[37]This inequality holds if

$$F_w - 2F_x > \frac{1-\psi}{\psi}\left[(t\tau^{\alpha})^{1-\sigma} + \left(\frac{\beta}{\tau}\right)^{\sigma-1}\right] F_x \times \max\left\{\left(\frac{\tau}{\beta}\right)^{\sigma-1}, \frac{1}{(t\tau^{\alpha})^{1-\sigma} - \tau^{1-\sigma}}\right\}.$$

The results of this paper still hold even when the above inequality does not. Such is the case because violation of the above inequality implies that an even larger fraction of active firms will establish a wholesale affiliate in country i. See section 2.5. It is, nevertheless, reasonable to presume that this inequality holds because, as shown in Table 7.1 of Yeaple (2008), not all of the exports of manufacturing affiliates are done within the boundary of the firm.

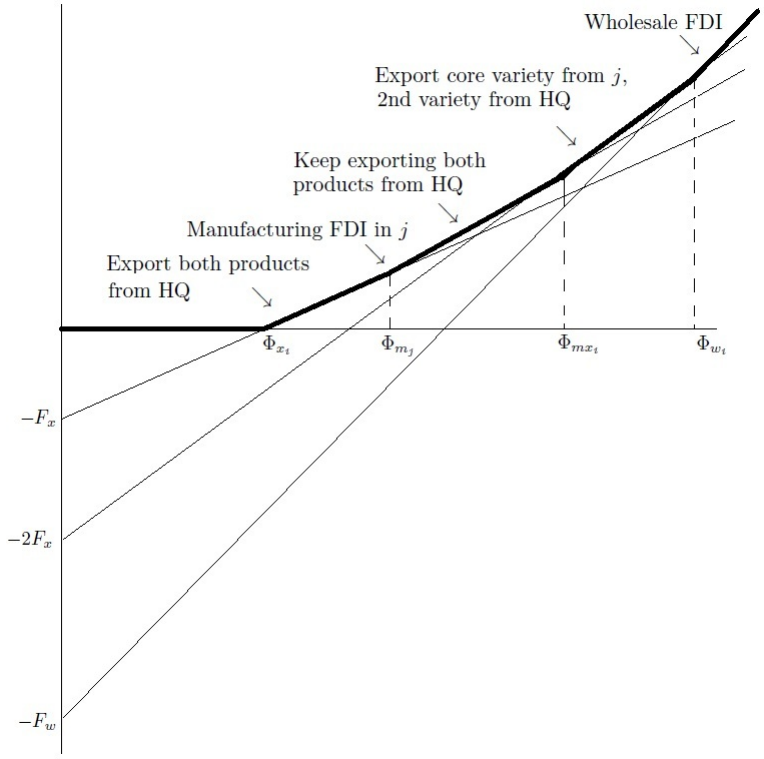


Figure 4: Logistical Options when both Products are Always Exported

$\tau^{1-\alpha}$, a firm establishes a wholesale affiliate only if the added fixed costs are offset by the higher sales that can be generated by avoiding having to share part of the surplus with the export intermediaries. The latter option yields total profits of $\Pi_{x_i(\phi)} = \psi A_i \phi^{\sigma-1} \left[(t\tau^{\alpha})^{1-\sigma} + \left(\frac{\beta}{\tau}\right)^{\sigma-1} \right] - 2F_x$, whereas the former option yields profits of $\Pi_{w_i} = A_i \phi^{\sigma-1} \left[(t\tau^{\alpha})^{1-\sigma} + \left(\frac{\beta}{\tau}\right)^{\sigma-1} \right] - F_w$. The productivity cut-off for establishing a wholesale affiliate in country i is Φ_{w_i}, and it is the solution to $\Pi_{x_i}(\Phi_{w_i}) = \Pi_{w_i}(\Phi_{w_i})$.

As is the case when countries i and j are relatively distant, a firm establishes a manufacturing affiliate in country i only when the added revenue generated from local production is sufficient to offset the higher fixed costs. Whereas the productivity cut-off for establishing a manufacturing affiliate in j is independent of the firm's actions in country i, the productivity cut-off for manufacturing FDI in country i — Φ_{m_i} — does depend upon the firm's actions in country j. Such is the case because wholesale FDI profits in country i are affected by the profits earned from importing the core variety that is produced in country j. Φ_{m_i} therefore depends upon both t and τ.[38] A firm that conducts

[38]It is possible to prove that a firm will prefer to establish a manufacturing affiliate in i to produce the core variety before it decides to produce the secondary variety there. Sketch of proof: the productivity cut-off for establishing a second production site in j is $\Phi_{m_j(2)} = \frac{\tau}{\beta}\left[\frac{F_m}{A_j(T-1)+A_i(Tt^{1-\sigma}-1)}\right]^{\frac{1}{\sigma-1}}$. By contrast, the hypothetical productivity cut-off for establishing a production site in i to produce the second variety without having a production site in j doing the same thing is $\hat{\Phi}_{m_i} = \frac{\tau}{\beta}\left[\frac{F_m}{A_j(Tt^{1-\sigma}-1)+A_i(T-1)}\right]^{\frac{1}{\sigma-1}}$. Comparing the two values, it can be verified that

manufacturing FDI in country i earns profits of $\Pi_{m_i}(\phi) = A_i\left(\frac{\phi}{\tau}\right)^{\sigma-1}\left(T+\beta^{\sigma-1}\right) - F_{mw}$. Φ_{m_i} is the productivity level at which $\Pi_{m_i}(\Phi_{m_i}) = \Pi_{w_i}(\Phi_{m_i})$. Table 4 summarizes all of the productivity cut-offs for operations in country i

Table 4: Summary of Productivity Cut-offs for Operations in Country i

Productivity Cut-off	Expression
$\Phi_{x_i(2)}$	$\frac{\tau}{\beta}\left[\frac{F_x}{\psi A_i}\right]^{\frac{1}{\sigma-1}}$
Φ_{xm_i}	$\left[\frac{F_x}{\psi A_i\left((t\tau^{\alpha})^{1-\sigma}-\tau^{1-\sigma}\right)}\right]^{\frac{1}{\sigma-1}}$
Φ_{w_i}	$\left[\frac{F_w-2F_x}{(1-\psi)A_i\left((t\tau^{\alpha})^{1-\sigma}+\left(\frac{\beta}{\tau}\right)^{\sigma-1}\right)}\right]^{\frac{1}{\sigma-1}}$
Φ_{m_i}	$\left[\frac{F_{mw}-F_w}{A_i\left(\tau^{\alpha(1-\sigma)}-(t\tau^{\alpha})^{1-\sigma}\right)}\right]^{\frac{1}{\sigma-1}}$
$\Phi_{m_i(2)}$	$\frac{1}{\beta}\left[\frac{F_m}{A_i\left(\tau^{\alpha(1-\sigma)}-(t\tau^{\alpha})^{1-\sigma}\right)}\right]^{\frac{1}{\sigma-1}}$

The feasible logistical options for serving country i when $t < \tau^{1-\alpha}$ are summarized in Table 5 (recall that the logistical options for serving country j are summarized in Table 2). There are six possible ways to serve country i, with either option (2') or (2") being chosen depending on whether equation (11) holds.

Table 5: Organization of Production to Serve Country i when $t < \tau^{1-\alpha}$

Option (#)	Arm's Length Exporting		Wholesale FDI		Manufacturing FDI	
	Variety		Variety		Variety	
	(1)	(2)	(1)	(2)	(1)	(2)
	Location of Production					
(1)	s	s	-	-	-	-
(2')	j	s	-	-	-	-
(2")	j	-	-	-	-	-
(3)	-	-	j	s	-	-
(4)	-	-	j	j	-	-
(5)	-	-	-	j	i	-
(6)	-	-	-	-	i	i

2.5 Empirical predictions on FDI patterns

In order to derive predictions about FDI patterns, I assume that productivity is Pareto distributed with shape parameter k and support on $[1, \infty)$. Let θ_w denote the probability of a firm establishing a wholesale affiliate relative to the probability of it not establishing an affiliate of either

$\Phi_{m_j(2)} < \hat{\Phi}_{m_i}$. Hence, in equilibrium a firm will not produce the second variety in i without first doing so in j.

sort. This could be either because it serves the market through arm's-length exports, or does not serve the market altogether. We can express θ_w as

$$\theta_w = \frac{\Pr\left[\Phi_w \leq \phi \leq \Phi_m\right]}{\Pr\left[\phi \leq \Phi_w\right]} = \frac{1 - \left(\frac{\Phi_w}{\Phi_m}\right)^k}{\left(\Phi_w\right)^k - 1}. \tag{12}$$

In both sets of industries a firm entering country j does not have any nearby affiliates. Hence, Φ_{w_j} and Φ_{m_j} are the same, irrespective of whether a manufacturing affiliate is used as an export platform, and so is θ_{w_j}. Not so for country i. Notice that Φ_{w_i} is strictly lower in lower when countries i and j are sufficiently close to each other. Such is the case for two reasons. First, a firm has a greater incentive to establish a wholesale affiliate in i when it deals with two export intermediaries instead of one. Second, the marginal cost of importing the main product is lower when there is a nearby manufacturing affiliate that can supply the product. While making a wholesale affiliate more lucrative, the existence of a nearby manufacturing site also lowers the incentive to establish a manufacturing affiliate in country i. Such is the case because the variable cost savings from establishing a manufacturing affiliate relative to a wholesale affiliate are no longer as great when the wholesale affiliate imports the core variety from a nearby manufacturing site as when the wholesale affiliate imports the core variety from the far-off parent company. Φ_{m_i} is consequently higher when t is low relative to τ. These changes in Φ_{w_i} and Φ_{m_i} suggest that the probability of a randomly observed multinational firm establishing a wholesale affiliate in a given country relative to not establishing any presence in the country whatsoever are higher if the firm operates a nearby manufacturing site.

Proposition 3: *The probability of a firm establishing a wholesale affiliate in a given country relative to the probability of it not establishing an affiliate of any sort are greater if the firm already operates a manufacturing affiliate in a nearby country that is closer to the host country than that of the parent firm.*

The probability of a firm establishing a manufacturing affiliate relative to the probability of it establishing a wholesale affiliate is equivalent to the fraction of firms establishing a manufacturing site relative to the fraction that establish a wholesale site. It can be expressed as

$$\theta_m = \frac{\Pr\left[\phi \geq \Phi_m\right]}{\Pr\left[\Phi_w \leq \phi \leq \Phi_m\right]} = \frac{1}{\left(\frac{\Phi_m}{\Phi_w}\right)^k - 1}. \tag{13}$$

Given the above the discussion it is evident that θ_{m_j} is the same regardless of the value of t. θ_{m_i},

however, is lower when t is sufficiently low as to enable manufacturing affiliates to be used as export platforms.

Proposition 4: *The probability of a firm establishing a manufacturing affiliate relative to the probability of it establishing a wholesale affiliate are lower if the firm operates a manufacturing affiliate in a nearby country that is closer to the host country than that of the parent firm.*

Propositions 3 and 4 provide testable predictions about a firm's location choice as both suggest that a firm's entry decision into one country will depend upon its entry decision in nearby countries.

3 Data

3.1 Data Sources

In the empirical section I test the underlying mechanisms behind Propositions 3 and 4 using data on the location decisions of French multinationals. I construct a unique dataset that covers the the operations of French multinationals in 58 countries in 2010 using hand collected data. Table 6 provides the list of the 58 countries. These countries were responsible for almost 95% of French outbound FDI in 2006 (the final year for which there is data on all countries).[39] The list of foreign affiliates for each firm was obtained from its 2010 annual report.[40] I focus only upon affiliates in which the parent company held at least a 50% stake in 2010.[41]

Each affiliate is classified as engaging in either manufacturing or in wholesale.[42] The affiliate is considered to engage in manufacturing if the firm owns at least one production site in the country.[43] A number of different data sources were used in order to classify each affiliate. The primary resource is a firm's annual financial reports. Many firms give a detailed breakdown of their foreign operations including the location of their production sites. A number of firms also provide this information on

[39] Source: OECD Globalization database, `http://stats.oecd.org/Index.aspx?DatasetCode=FDI_FLOW_PARTNER#`.

[40] Most firms make their annual reports available in the finance section of the parent's website. Annual reports can also be obtained from Mergent Online.

[41] A list of publicly traded French multinationals whose primary business is a manufacturing industry was obtained from Bureau van Dijk (BVD). The BVD data contained a number of firms that sell manufacturing products but outsource all production to third parties. It also contained a number of firms that do operate at least one manufacturing site, but do so only outside of France. I omit both sets of firms since their operations are inconsistent with the theory being tested. The former set of firms are more consistent with theories on carry-along trade, as in Bernard et al. (2012), whereas the latter set of firms are more in line with models of vertical FDI since they offshore production abroad. Neither of carry-along trade nor vertical FDI is the focus of the present paper which deals with horizontal and export-platform FDI.

[42] I omit all holding and financial companies.

[43] My approach differs from Krautheim (2009) who considered the aggregate number of manufacturing and wholesale affiliates in a given country. His results are therefore not entirely comparable to mine since many firms own multiple affiliates in the same country.

Table 6: List of Countries

Algeria	Colombia	Hungary	Malaysia	Romania	Thailand
Argentina	Croatia	India	Mexico	Russia	Tunisia
Australia	Czech Rep.	Indonesia	Morocco	Serbia	Turkey
Austria	Denmark	Ireland	Netherlands	Singapore	UK
Belgium	Ecuador	Israel	New Zealand	Slovakia	Ukraine
Brazil	Egypt	Italy	Norway	Slovenia	Uruguay
Bulgaria	Estonia	Japan	Peru	South Africa	US
Canada	Finland	Korea	Philippines	Spain	Vietnam
Chile	Germany	Latvia	Poland	Sweden	
China*	Greece	Lithuania	Portugal	Switzerland	

* I treat China and Hong Kong as one country.

the parent's or the affiliate's website. I also rely upon national business registers. Some countries provide a searchable database of business entities registered within their borders. For each establishment a register provides information on the entity's main line of business. Additional sources of information include Factiva, Hoover's, and ISI Emerging Markets. Factiva is a database operated by DowJones that provides balance sheet data as well as the primary business activity of a large number of companies throughout the world. Hoover's is operated by Dun & Bradstreet and provides information similar to that of Factiva.[44] Lastly, ISI Emerging Markets is operated by Euromoney Institutional Investor. It provides information similar to Factiva and Hoover's, though its focus is restricted to emerging markets such as Eastern Europe, Latin America and Southeast Asia. I use Factiva and Mergent Online to obtain the primary industry of the parent firm at the two-digit SIC level.

Standard gravity variables that have been shown to influence a firm's entry decision are also included among the regressors.[45] Population and real PPP-adjusted GDP are obtained from the World Economic Outlook database of the IMF. I use both to construct each country's real per-capita GDP. Data on bilateral distance as well as dummy variables indicating that the host borders France or was once colonized by it were obtained from CEPII. I use GDP and distance data to construct each country's surrounding market potential. As in Blonigen et al. (2007), $SMP_n = \sum_{n' \neq n} \frac{GDP_{n'}}{\tau_{nn'}}$, with n' denoting every country in the world sans France. SMP_n reflects the alternative investment options for the firm within the region.[46] The literature has also identified the importance of a host country's

[44] Other authors to have used Dun & Bradstreet data are Alfaro and Charlton (2009).

[45] Yeaple (2009) finds that a country's distance from the US, whether English is its main language, its GDP and its per-capita GDP can explain nearly three-quarters of the variation in the number of firms investing in a given country as well as their aggregate sales there.

[46] Yeaple (2009) did not control for a country's SMP whereas Chen and Moore (2010) included a country's market potential (MP), which is the sum of its GDP and SMP. This variable does not distinguish between a country's size and its geographic proximity to larger markets. For the 58 countries in this study the correlation between a country's

financial sector in influencing a firm's entry decision and performance.[47] I use the amount of domestic credit provided to the private sector as a percentage of GDP as a proxy for the host country's financial development.[48] It is obtained from the World Bank's World Development Indicators.[49]

In addition to bilateral distance I include two other measures of trade costs. The first is the tariff rate that the host country imposes on imports from France and is collected at the two-digit SIC level. It is obtained from the World Integrated Trade Solution (WITS) database. The second measure pertains to various non-tariff regulations that countries put in place that impose a burden on importing. The World Bank's Doing Business database contains three indicators of import restrictions: (i) the number of days that it takes to import a container, (ii) the number of documents necessary to import a container, and (iii) the monetary cost of importing a container. Bernard et al. (2011) point out that these three indicators are correlated. Hence, I follow their approach by using the primary factor derived from principal component analysis of these three variables. The constructed variable is called Trade Freedom. A lower value indicates that the host country has more restrictive regulations. Table 7 provides summary statistics for the macro economic variables.

Table 7: Summary of Macro Variables and Data Sources

Variable	Data Source	Average	Std. Dev.
GDP	WDI	26.38	1.42
GDP per capita	WDI	9.45	0.81
Private Credit	WDI	4.31	0.70
Distance	CEPII	7.96	1.1
SMP	WDI, CEPII	23.55	0.46
Tariff	WITS	4.94	9.34
Import Freedom	Doing Business	0.93	0.72

All variables except Tariff and Import Freedom are in natural logs.

3.2 Descriptive statistics

The sample is comprised of 1776 affiliates belonging to 110 firms whose primary business is a manufacturing industry. 913 of these are manufacturing affiliates and 863 are wholesale affiliates. 96 firms operate at least one wholesale affiliate and 99 firms operate at least one manufacturing affiliate. 85 firms operate affiliates of both types. Panel (a) of Figure 5 provides a breakdown of the firms

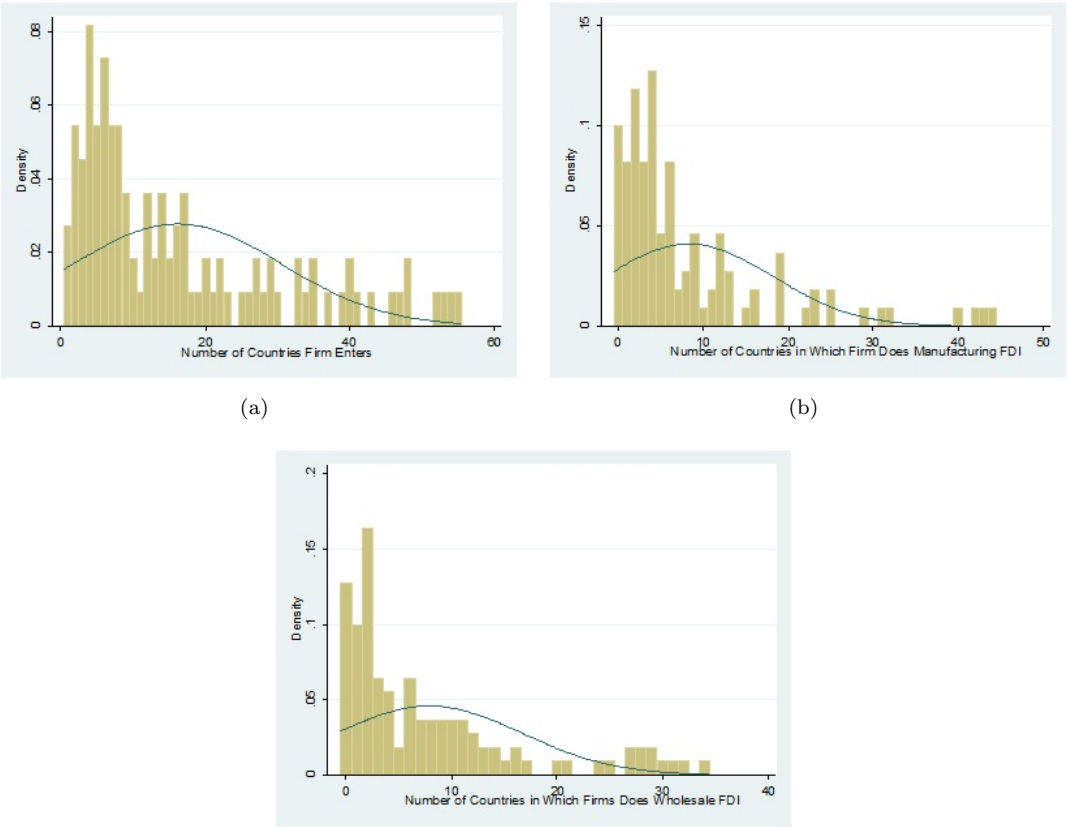
GDP and SMP is -0.26. By contrast, the correlation between its GDP and MP is 0.99. Blonigen et al. (2007) include GDP and SMP in one regression and only MP in another regression in their study of their impact on a host country's aggregate inbound FDI and show that the coefficient estimates for GDP and MP are vastly different.

[47] See Desai et al. (2004), Chor et al. (2008), Antràs et al. (2009) and Buch et al. (2009).

[48] Chor et al. (2008) and Antràs et al. (2009) use a similar measure as an indicator of the financial development of the host country.

[49] The data is for 2008 for all countries except Norway. The latest year for which data for Norway is available is 2006, and that is the one that is used.

by the total number of countries in which they operate affiliates of either sort. The average firm operates in 16.15 countries, whereas the median firm operates in 10.5 countries, indicating that the sample is heavily skewed. 33 firms have operations in 20 or more countries, 20 operate in at least 30 countries, 12 firms have operations in 40 or more countries, and the largest firm operates in 55 of the 58 countries.



(a) (b)

(c)

Figure 5: Distribution of Firms by Number of Countries Entered

Panel (b) of figure 5 focuses on manufacturing affiliates only. It provides a breakdown of the number of firms that operate a given number of manufacturing affiliates. The average firm had a manufacturing presence in 7.95 countries. The median firm, by contrast, had manufacturing operations in only 4 countries.[50] 30 firms have a manufacturing presence in 10 or more countries, 12 firms have a manufacturing presence in 20 or more countries, 6 firms operate manufacturing sites in at leat 30 countries and the largest firm operates manufacturing sites in 44 countries.

Panel (c) of Figure 5 focuses on wholesale affiliates. The average firm operates wholesale affiliates

[50]The figures provided are for all 110 firms. Looking solely at the 99 firms that operate at least one manufacturing site, the average and median number of manufacturing affiliates are 9.22 and 5, respectively.

in 7.85 countries, whereas the median firm operates in 4 countries.[51] 32 firms operate wholesale affiliates in 10 or more countries, 12 firms operate in 20 or more countries, and 4 firms have wholesale operations in 30 or more countries.

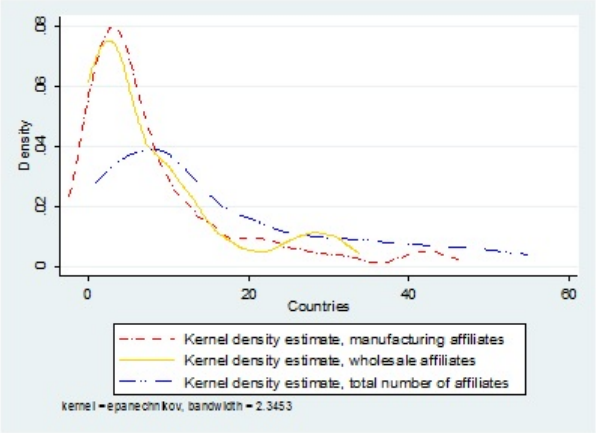


Figure 6: Kernel Density Plot, Number of Countries Entered

Table 8: 20 Most Popular Destinations by Form of Entry

	Entry		Manufacturing FDI		Wholesale FDI	
Rank	Country	Number of Firms	Country	Number of Firms	Country	Number of Firms
1	US	88	US	60	Belgium	41
2	UK	80	China	50	UK	36
3	Germany	74	Spain	47	Germany	34
4	Spain	74	UK	44	Italy	30
5	Italy	69	Germany	40	Japan	29
6	China	64	Brazil	40	Netherlands	29
7	Belgium	60	Italy	39	Singapore	29
8	Poland	53	Poland	32	Switzerland	29
9	Brazil	50	India	29	US	28
10	Switzerland	45	Canada	27	Spain	27
11	Netherlands	44	Mexico	27	Austria	23
12	Canada	43	Romania	21	Czech Rep.	23
13	Japan	43	Russia	21	Portugal	22
14	Mexico	40	South Africa	21	Sweden	22
15	Czech Rep.	39	Hungary	20	Australia	21
16	Australia	38	Argentina	19	Poland	21
17	India	38	Belgium	19	Greece	18
18	Portugal	38	Australia	17	Russia	17
19	Russia	38	Korea	17	Canada	16
20	Singapore	36	Tunisia	17	Norway	16
Total		1054		607		511

Figure 6 presents the kernel density estimates of the number of countries that a firm enters broken

[51] These figures include all 110 firms. Among the 96 firms that operate at least one wholesale affiliate the average firm operates in 8.99 countries and the median in 6 countries.

down by form of entry. While the size distribution of firms in terms of the number of countries that a firm chooses to enter through either manufacturing FDI or wholesale FDI appear similar in Figures 5 and 6, this in now way suggests that the location decision for the two forms of FDI is similar. For one, performing the Kolmogorov-Smirnov test enables us to reject the hypothesis that the distributions are the same. A further reason for why the location decision for the two forms of FDI is dissimilar is provided in Table 8. It presents the 20 most popular destinations for FDI, both overall as well as broken down by form of FDI. Notice that there is very little correlation in terms of a country's popularity as a recipient of manufacturing FDI and its popularity as a recipient of wholesale FDI. Whereas Belgium has more than twice as many firms operating wholesale affiliates as the number of firms operating manufacturing affiliates, the reverse is true for the US. Similarly, whereas Austria, the Czech Republic, Japan, the Netherlands, Norway, Singapore, Sweden and Switzerland are not very popular destinations for manufacturing FDI they are popular destinations for wholesale FDI. Conversely, Argentina, Brazil, India and Mexico are popular destinations for manufacturing FDI, but less so for wholesale FDI. The main outliers are Canada, Germany, Italy, Poland, Russia and the UK, all of which attract both forms of FDI in roughly equal proportions.

The 20 most popular destinations account for a substantial majority of both types of affiliates observed. This can be seen from the bottom row of Table 8. In total, the 20 most popular destinations account for about 59% of the total observations. The 20 most popular destinations for manufacturing affiliates account for about 66% of all manufacturing affiliates, and the 20 most popular destinations for wholesale affiliates account for 59% of all wholesale affiliates.

4 Estimation

4.1 Estimation Strategy

The theory predicts that firm f is more likely to enter market n through a wholesale affiliate (w) if it has a manufacturing site in a nearby market j. By contrast, having a manufacturing site in a nearby country makes it less likely that the firm will enter through a manufacturing affiliate (m). In the simple two-product firm model outlined above a sole production site in a nearby country is sufficient to reproduce these results. With multiple products, however, a single production site nearby may not necessarily impact a firm's entry decision into a neighboring country. Further complicating the matter is the fact that a MNC's product scope may be not be positively correlated with its propensity to engage in FDI, as noted by Yeaple (2012). Since I do not have data on a firm's product

scope I address this issue by including a firm fixed effect among my regressors, which controls for all firm characteristics including firm size (i.e., productivity) and its product scope.

The theory establishes that not all manufacturing affiliates can be used to supply wholesale affiliates operated by the parent company in other countries. Consequently, the focus should be on the MNC's presence within a reasonable distance of a host country instead of on its worldwide operations.[52] For instance, a firm's entry decision into Canada is more likely to depend upon a firm having a manufacturing presence in the US than upon the firm having a manufacturing presence in Australia. Moreover, the manufacturing site should be more proximate to the host than France is. I therefore focus on the number of countries within a given radius of country n and that border country n that are closer to n than France is. I denote this variable by $M_f(n, n')$. In the estimation results below I focus on a radius of 2000 km. Results for the case when the radius is varied between 1500-5000 km are similar and are provided in Table B-1 in the appendix. Table 9 provides summary statistics for the $M_f(n, n')$ variable for the case when the radius is set to 2000 km. Figure 7 plots the distribution of $M_f(n, n')$ for all affiliates, all manufacturing affiliates, and all wholesale affiliates.

Table 9: Summary statistics for $M_f(n, n')$ for 2000km radius

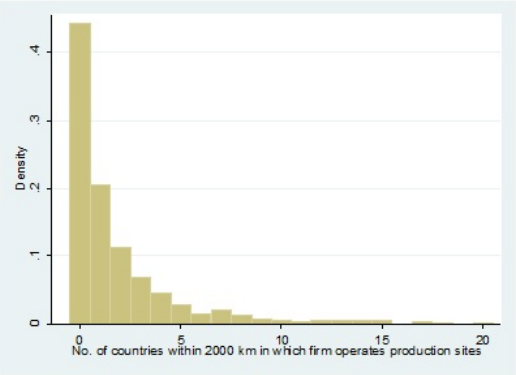
Sample	Mean	Median	Std. Deviation	Min	Max	Sample Size
All observations	1.16	0	2.24	0	20	6380
All affiliates	1.89	1	3.06	0	20	1776
All manufacturing affiliates	2.18	1	3.40	0	19	913
All wholesale affiliates	1.58	1	2.61	0	20	863

The estimation strategy focuses on a multinomial firm decision. A firm has three options: (i) stay out of the market altogether, (ii) enter through a wholesale affiliate, and (iii) establish a manufacturing affiliate. Let $e \in \{0, w, m\}$ denote the firm's decision, where $e = 0$ denotes that the firm chooses not to enter the country, whereas $e = w$ and $e = m$ denote that the firm enters by establishing a wholesale or a manufacturing affiliate, respectively. Its decision depends upon its utility from either approach:

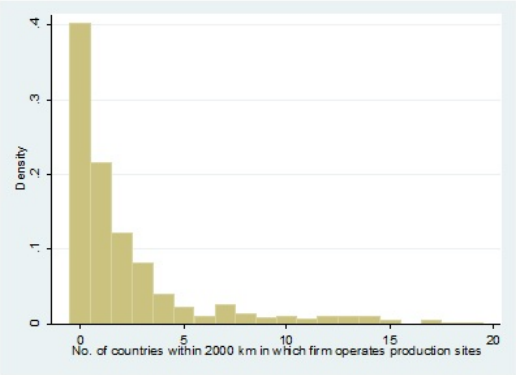
$$U_{ef} = \Pi_{ef}\left(M_f(n, n'), Z_n, \alpha_f\right) + \varepsilon_{ef}. \tag{14}$$

Z_n is a matrix of host country characteristics, which include the gravity variables discussed earlier.

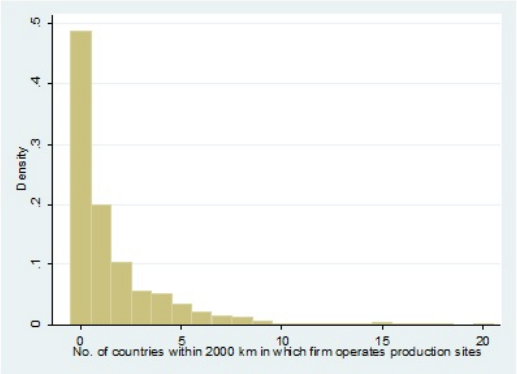
[52] In their analysis of the impact of US FDI into third countries on US FDI into a given host country Blonigen et al. (2007) used a weighting matrix whereby US FDI into other countries was weighed by the distance of each country from a given host. Due to costly intra-firm trade, however, considering a firm's operations everywhere else in the world would be inconsistent with the theory.



(a) All Affiliates



(b) All Manufacturing Affiliates



(c) All Wholesale Affiliates

Figure 7: Distribution of Nearby Manufacturing Sites

All continuous gravity variables aside from the tariff rate and import freedom are in logs. The variable $M_f(n, n')$ is in levels. α_f is a matrix of firm characteristics, which include fixed effects for both the firm and the primary two-digit SIC industry of the parent.

Table 10: Summary of Probabilities and Odds Ratios

Observed Firm Decision	Probability	Odds (Relative to Wholesale Affiliate)
Manufacturing Affiliate	0.143	1.058
Wholesale Affiliate	0.135	1
No Affiliate	0.722	5.335

Propositions 3 and 4 are tested using multinomial logit. Multinomial logit estimation with z outcomes is based upon the simultaneous estimation of $z-1$ logit decisions, with one of the outcomes normalized as the base outcome. I choose the establishment of a wholesale affiliate as the base outcome. The two logit regressions performed, therefore, as

$$\ln\left(\frac{p_m}{p_w}\right) = \Pi(\cdot),$$

$$\ln\left(\frac{p_0}{p_w}\right) = \Pi(\cdot),$$

where p_e is the probability that option e is chosen. Table 10 presents the probabilities of each option being chosen as well as the odds ratio for each option relative to $e = w$ as the base outcome. A positive coefficient in the first regression means that an increase in the regressor increases the log odds of m being chosen relative to w. A positive coefficient in the second regression means that an increase in the value of the regressor raises the log odds of 0 being chosen relative to w.

4.2 Estimation Results

4.2.1 Impact of Gravity Variables on Entry Decision

Before testing the main results of the model I examine the impact of the gravity variables on a firm's entry decision. Estimation results for multinomial logit entry decision are provided in Table 11.

Distance and Trade Barriers: in columns (1) and (2) I examine the impact of trade costs on a firm's entry decision without controlling for other country characteristics. This is similar to the empirical strategy of Krautheim (2009). The sign on the coefficient estimates match his findings. Firms are less likely to enter more distant markets. Those that do enter prefer to do so through manufacturing FDI rather than wholesale FDI. In keeping with the tariff-jumping motive for manufacturing FDI, firms are more likely to establish a manufacturing affiliate relative to a wholesale affiliate in countries with higher tariffs. Firms are also more likely to enter countries with lower non-tariff trade barriers and prefer to do so through wholesale FDI rather than manufacturing FDI. These findings are consistent with the predominant view that wholesale affiliates are primarily established as a means of exporting from the parent.

These predictions are overturned in columns (3)-(5). Once I control for the primary gravity variables a firm becomes less likely to establish a manufacturing affiliate relative to a wholesale affiliate in more distant countries. Moreover, the tariff rate has no statistically significant impact on a firm's choice between a manufacturing and a wholesale affiliate. In column (5) we can see that doubling a country's distant from France lowers the odds of it establishing a manufacturing affiliate relative to a wholesale affiliate by about 0.29. To put this into perspective, a 29% increase in the odds of a manufacturing affiliate being established relative to a wholesale affiliate raises the odds ratio from 1.058 to 1.365 (see Table 10 for odds ratios). This challenges the hypothesis that wholesale affiliates are simply a means of exporting and provide the first evidence in support of the model's predictions.

Table 11: Firm Entry Decision

Firm Choice	Variable	(1)	(2)	(3)	(4)	(5)
Manufacturing Affiliate						
	Distance	0.201***	0.107*	-0.161**	-0.329***	-0.349***
		(0.058)	(0.059)	(0.081)	(0.113)	(0.113)
	Tariff		0.025***	0.014	0.009	0.009
			(0.009)	(0.010)	(0.010)	(0.010)
	Import Freedom		-0.251***	-0.106	-0.107	-0.091
			(0.077)	(0.084)	(0.087)	(0.087)
	GDP			0.485***	0.436***	0.435***
				(0.076)	(0.078)	(0.078)
	GDP per capita			-0.444***	-0.449***	-0.424***
				(0.100)	(0.100)	(0.105)
	Contiguity			-0.122	-0.070	-0.080
				(0.200)	(0.209)	(0.209)
	SMP				-0.560**	-0.602**
					(0.256)	(0.258)
	Colony				0.699***	0.707***
					(0.195)	(0.195)
	Private Credit					-0.053
						(0.105)
No Affiliate						
	Distance	0.377***	0.250***	0.323***	0.468***	0.417***
		(0.061)	(0.063)	(0.084)	(0.102)	(0.104)
	Tariff		0.032***	0.039***	0.038***	0.036***
			(0.007)	(0.007)	(0.007)	(0.007)
	Import Freedom		-0.372***	-0.138*	-0.196**	-0.109
			(0.074)	(0.077)	(0.077)	(0.075)
	GDP			-0.657***	-0.665***	-0.646***
				(0.054)	(0.055)	(0.055)
	GDP per capita			-0.303***	-0.293***	-0.188*
				(0.094)	(0.094)	(0.104)
	Contiguity			-0.820***	-0.712***	-0.726***
				(0.199)	(0.206)	(0.206)
	SMP				0.417**	0.322
					(0.207)	(0.213)
	Colony				0.264	0.271
					(0.207)	(0.208)
	Private Credit					-0.292***
						(0.098)
	Firm FE	Yes	Yes	Yes	Yes	Yes
	Industry FE	Yes	Yes	Yes	Yes	Yes
	Observations	6380	6380	6380	6380	6380
	Firms	110	110	110	110	110
	Log Pseudolikelihood	-3626.54	-3591.48	-2976.02	-2955.10	-2949.15
	Pseudo R^2	0.28	0.28	0.41	0.41	0.41

*, ** and *** denote significance at the 10, 5 and 1% level.
Standard errors are clustered at the firm level and adjusted for heteroskedasticity.
Estimation through multinomial logit. Base outcome: establishment of a wholesale affiliate.

GDP: the coefficient on GDP is statistically significant and takes on the expected sign. A higher GDP makes it more likely that a firm will enter a market and will do so through a manufacturing affiliate. Doubling a country's GDP lowers the odds of it staying out of the market relative to establishing a wholesale affiliate by about 0.48. At the same time, doubling GDP increases the odds of establishing a manufacturing affiliate over a wholesale affiliate by between 0.54.

GDP per capita and host financial development: as expected, firms are less likely to stay out of richer markets. In column (3) doubling a country's per-capita GDP lowers the odds of a firm staying out relative to it entering through a wholesale affiliate by between about 0.26. Firms are also

much more likely to enter richer countries through a wholesale affiliate relative to a manufacturing affiliate. Doubling a country's wealth increases the odds of choosing to establish a wholesale affiliate over the odds of establishing a manufacturing affiliate by about 0.35.

The impact of per-capita GDP on the odds of a firm staying out of the market relative to the odds of it establishing a wholesale affiliate are sensitive to the inclusion of a variable that controls for a host country's financial development. In column (5) we can see that including the variable Private Credit cuts the impact of per-capita GDP on the log odds by nearly a third.[53] We can also see that firms are more likely to enter countries with more developed credit markets—doubling the amount of credit supplied to the private sector lowers the odds of a firm staying out of the market by about 0.25. At the same time we can see that Private Credit does not have a statistically significant impact on the trade-off between a manufacturing and a wholesale affiliate.

Previous papers have established that domestic firms are more sensitive to a host country's financial development than the foreign affiliates of multinationals because the latter can tap into additional credit resources within the boundaries of the firm.[54] Regression results from column (7) indicate that intra-firm credit is insufficient, and that foreign affiliates do rely upon domestic capital markets for some of their financing. The extent to which manufacturing affiliates are reliant upon domestic credit markets is statistically no different from the reliance of wholesale affiliates.

4.2.2 Export-platform Wholesale Affiliates and Firm Entry Decision

Table 12 presents the main estimation results of the paper. In it I include the variable $M_f(n, n')$ for the case when the radius is set to 2000 km, along with the gravity variables considered in Table 11.[55] Columns (1)-(3) of Table 12 correspond with columns (3)-(5) of Table 11. $M_f(n, n')$ is significant at the 1% level throughout and takes on the expect sign. A one unit increase in the number of countries within 2000 km of the host in which the firm operates manufacturing sites lowers the odds of a firm establishing an additional manufacturing affiliate relative to a wholesale affiliate by about 10%. Given the odds ratios in Table 10, we can see that a one unit increase in $M_f(n, n')$ lowers the odds of a manufacturing affiliate being established relative to a wholesale affiliate from 1.058 to 0.949.

[53] Interestingly, including Private Credit in the regression does not effect the impact of per-capita GDP on a firm's choice between a manufacturing and a wholesale affiliate. One possible reason as to why firms are more likely to choose wholesale FDI over manufacturing FDI in richer countries is because competition from domestic firms is likely to be fiercer there. This lowers the returns on a firm's investment, making it less likely that it will choose the cheaper option (wholesale FDI).

[54] See Desai et al. (2008) for evidence on affiliates of US MNCs, and Manova et al. (2011) for evidence for firms operating in China.

[55] Table D-1 in the appendix provides estimation results for the cases when the radius varies from 1500-5000 km.

Table 12: Impact of Nearby Manufacturing Sites on Firm Entry Decision with Macro Variables

		Estimate		
Firm Choice	Variable	(1)	(2)	(3)
Manufacturing Affiliate	$M_f(n,n')$	-0.120***	-0.106***	-0.109***
		(0.033)	(0.033)	(0.034)
	Distance	-0.216**	-0.324***	-0.349***
		(0.088)	(0.120)	(0.121)
	Tariff	0.009	0.005	0.005
		(0.010)	(0.010)	(0.0710)
	Import Freedom	-0.116	-0.128	-0.102
		(0.086)	(0.088)	(0.087)
	GDP	0.452***	0.411***	0.412***
		(0.077)	(0.078)	(0.078)
	GDP per capita	-0.463***	-0.467***	-0.430
		(0.104)	(0.103)	(0.107)
	Contiguity	-0.379*	-0.248	-0.263
		(0.225)	(0.233)	(0.235)
	SMP		-0.425	-0.476*
			(0.269)	(0.269)
	Colony		0.718***	0.729***
			(0.201)	(0.201)
	Private Credit			-0.092
				(0.111)
No Affiliate	$M_f(n,n')$	-0.142***	-0.159***	-0.167***
		(0.042)	(0.043)	(0.044)
	Distance	0.254***	0.450***	0.390***
		(0.085)	(0.105)	(0.106)
	Tariff	0.034***	0.033***	0.030***
		(0.007)	(0.007)	(0.009)
	Import Freedom	-0.144*	-0.224***	-0.126*
		(0.077)	(0.077)	(0.075)
	GDP	-0.684***	-0.691***	-0.671***
		(0.054)	(0.055)	(0.055)
	GDP per capita	-0.323***	-0.313***	-0.193*
		(0.098)	(0.098)	(0.106)
	Contiguity	-1.073***	-0.965***	-0.995***
		(0.209)	(0.213)	(0.215)
	SMP		0.601***	0.502**
			(0.215)	(0.217)
	Colony		0.264	0.274
			(0.209)	(0.210)
	Private Credit			-0.338***
				(0.103)
	Firm FE	Yes	Yes	Yes
	Industry FE	Yes	Yes	Yes
	Observations	6380	6380	6380
	Firms	110	110	110
	Log Pseudolikelihood	-2963.50	-2941.17	-2933.85
	Pseudo R^2	0.41	0.41	0.41

*, ** and *** denote significance at the 10, 5 and 1% level.
Standard errors are clustered at the firm level and adjusted for heteroskedasticity.
Estimation through multinomial logit. Base outcome: establishment of a wholesale affiliate.

At the same time, an increase in $M_f(n,n')$ lowers the odds of not establishing an affiliate of any sort relative to establishing a wholesale affiliate fall by about 15%. This means that the odds ratio falls from 5.335 to 4.514, which is a sizeable decline. Table 13 puts these numbers into perspective. It displays the original probabilities of each of the three possible decisions that are observed as well as the ones predicted by the estimation results in Table 12 due to a one unit increase in $M_f(n,n')$.

Table 13: Modified Probabilities and Odds Ratios

Firm Decision	Original Probability	Original Odds	Predicted Probability	Predicted Odds
Manufacturing Affiliate	0.143	1.058	0.147	0.949
Wholesale Affiliate	0.135	1	0.155	1
No Affiliate	0.722	5.335	0.698	4.514

Odds ratios are relative to the probability of a firm establishing a wholesale affiliate. The predicted probabilities and odds are based upon the estimation results in Table 12 of a one unit increase in $M_f(n, n')$.

Comparing column (5) of Table 11 with column (3) of Table 12 shows that the inclusion of $M_f(n, n')$ hardly effects the coefficient estimates of most macro variables. This suggests that $M_f(n, n')$ is not strongly correlated with them. The main exceptions are contiguity and SMP. Including $M_f(n, n')$ does not effect either the sign of the significance of contiguity. However, it does increase the impact of contiguity on a firm's choice of establishing a wholesale affiliate relative to no affiliate whatsoever. The coefficient estimate on SMP is also affected. Including $M_f(n, n')$ lowers the impact of SMP on a firm's choice between a manufacturing and a wholesale affiliate while increasing its impact on the choice between a wholesale affiliate and no affiliate.

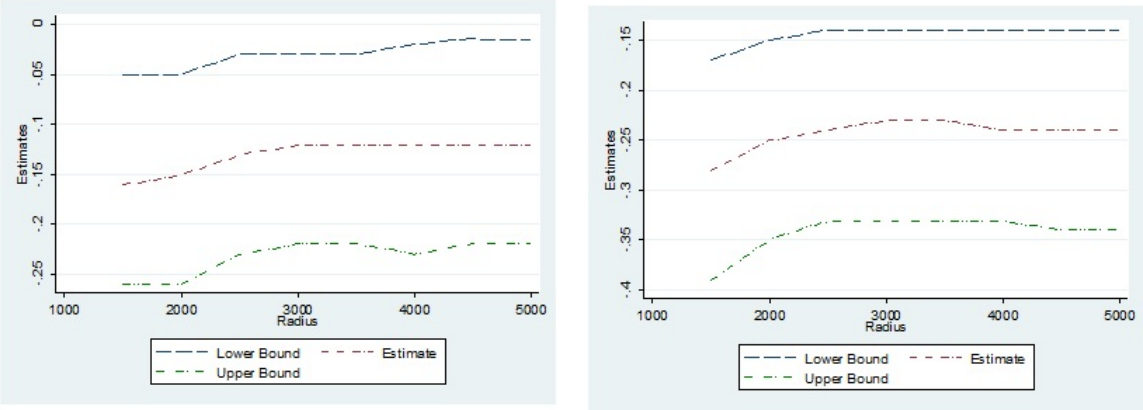
Table 14: Impact of Nearby Manufacturing Sites on Firm Entry Decision with Country Fixed Effects

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Choice	Variable	Radius 1500 km	Radius 2000 km	Radius 2500 km	Radius 3000 km	Radius 3500 km	Radius 4000 km	Radius 4500 km	Radius 5000 km
Man. Affiliate	$M_f(n, n')$	-0.159***	-0.151***	-0.132***	-0.124**	-0.125**	-0.125**	-0.118**	-0.118**
		(0.054)	(0.053)	(0.051)	(0.050)	(0.050)	(0.052)	(0.052)	(0.052)
No Affiliate	$M_f(n, n')$	-0.283***	-0.248***	-0.236***	-0.234***	-0.235***	-0.238***	-0.241***	-0.241***
		(0.055)	(0.051)	(0.049)	(0.048)	(0.048)	(0.50)	(0.050)	(0.052)
	Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Obs.	6380	6380	6380	6380	6380	6380	6380	6380
	Firms	110	110	110	110	110	110	110	110
	Log PL	-2679.52	-2680.47	-2681.23	-2680.93	-2680.87	-2680.48	-2680.06	-2680.44
	Pseudo R^2	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46

* and ** denote significance at the 5 and 1% level.
Standard errors are clustered at the firm level and adjusted for heteroskedasticity.
Estimation through multinomial logit. Base outcome: establishment of a wholesale affiliate.

Table 14 provides a robustness check. In it I regress a firm's entry decision upon the variable $M_f(n, n')$ along with country fixed effects. This controls for any host country characteristics that were not captured by the variables considered in this paper. The radius is varied between 1500-5000 km in increments of 500 km. The results are strongly supportive of the theory. A one unit increase in the number of nearby countries in which a firm operates a manufacturing site lowers the odds of a firm establishing a manufacturing affiliate relative to a wholesale affiliate by between 11-15%,

depending upon the radius. At the same, the odds of a firm staying out of the market relative to establishing a wholesale affiliate fall by between 21-25 %. Figure 8 plots the estimation results and the upper and lower bounds of the 95% confidence interval. These results provide further evidence that wholesale affiliates are primarily established in countries close to manufacturing affiliates.



(a) Manufacturing-Wholesale Affiliate Trade-off

(b) Wholesale Affiliate-No Entry Trade-off

Figure 8: Coefficient Estimates and 95% Confidence Intervals, Regression with Country FE

5 Conclusion

Over the past several years the international trade literature has recognized that a multinational firm's investment decision in a pair of nearby countries could be interdependent. Papers such as Blonigen et al. (2007) have studied whether the amount of inbound FDI a country receives depends upon the amount received by neighboring countries, while Baltagi et al. (2008) , Chen (2008) and Antràs and Foley (2011) have looked at the impact of trade liberalization on FDI at the firm, industry and national level. A different strand of the literature has recognized that a large number of multinational firms own affiliates abroad that are engaged in activities such as distribution, wholesale and retail and do not manufacture their own products. Important contributions include papers by Head and Ries (2001), Hanson et al. (2001), Zeile (2003) and Krautheim (2009). This paper is the first attempt to examine the interaction of these two features in determining a firm's entry decision. I construct a three-country model with heterogeneous firms. The model predicts that if the two foreign countries are close enough to each other relative to their distance from the country of the multinational firm, then a firm's entry decision in one country depends upon its actions in the other country. The establishment of a manufacturing affiliate in one country increases the probability of a firm establishing a wholesale affiliate in the other country while decreasing the probability that it

will establish a manufacturing affiliate.

These predictions are tested using a unique, hand collected dataset on the foreign operations of French multinationals in 2010 I find strong evidence that a firm's entry decision into a given country is linked to its actions in neighboring countries. Conditioning upon host country and firm characteristics, a one unit increase in the number of nearby countries in which a firm already operates a manufacturing affiliate increases the probability that a firm will enter a given market through a wholesale affiliate rather than through a manufacturing affiliate. The probability that a wholesale affiliate is established relative to no affiliate is also increasing in the number of nearby manufacturing affiliates. Both results are significant at standard levels.

Another novel finding of the paper is that firms do not prefer to establish wholesale affiliates relative to manufacturing affiliates in more distant markets. To the contrary, I find that increasing a country's distance from France lowers the odds of a firm establishing a manufacturing affiliate relative to a wholesale affiliate by almost 0.3. At the same time, there is evidence to suggest that less burdensome importing regulations increase the odds of a firm establishing a wholesale affiliate in a country. This indicates that wholesale affiliates do rely upon imported products. These imports, however, come primarily from manufacturing affiliates controlled by the firm rather than from the parent.

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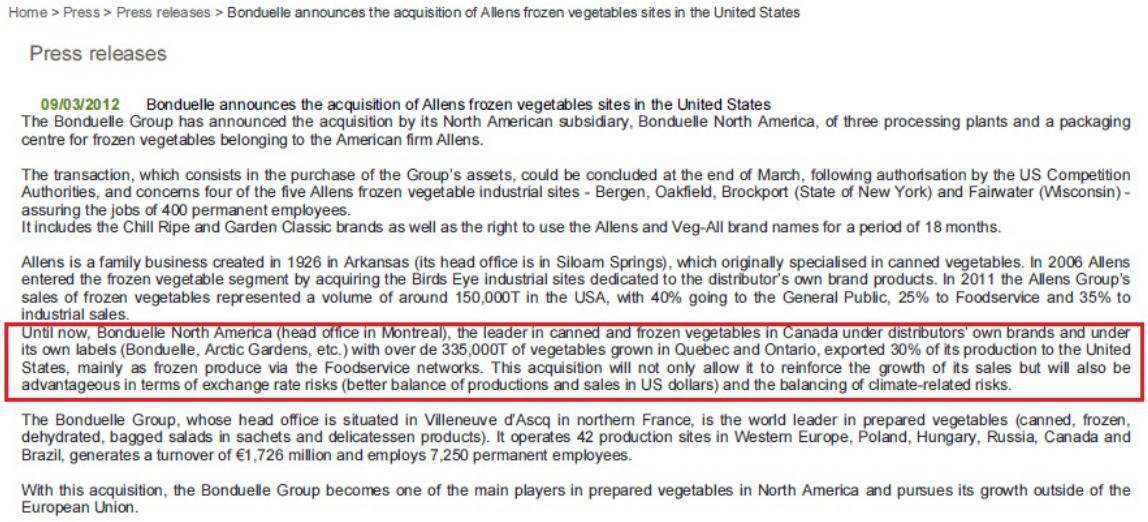
A Examples of Export Platform FDI

This section presents some evidence on export-platform FDI and inter-affiliate trade focusing on the operations of four French multinationals: Bonduelle, Michelin and Nexans. The information presented here was obtained from a combination of affiliate websites and firm press releases.

A.1 Bonduelle

The following two graphics are press releases from food manufacturer Bonduelle. The first press release was downloaded from `http://www.bonduelle.com/en/press/press-releases/97/bonduelle-announces-the-acquisition-of-allens-frozen-vegetables-sites-in-the-united-states.html#axzz290fyH3S5` on Oct. 11, 2012. It describes the operations of its North American affiliate.



Home > Press > Press releases > Bonduelle announces the acquisition of Allens frozen vegetables sites in the United States

Press releases

09/03/2012 **Bonduelle announces the acquisition of Allens frozen vegetables sites in the United States**

The Bonduelle Group has announced the acquisition by its North American subsidiary, Bonduelle North America, of three processing plants and a packaging centre for frozen vegetables belonging to the American firm Allens.

The transaction, which consists in the purchase of the Group's assets, could be concluded at the end of March, following authorisation by the US Competition Authorities, and concerns four of the five Allens frozen vegetable industrial sites - Bergen, Oakfield, Brockport (State of New York) and Fairwater (Wisconsin) - assuring the jobs of 400 permanent employees.
It includes the Chill Ripe and Garden Classic brands as well as the right to use the Allens and Veg-All brand names for a period of 18 months.

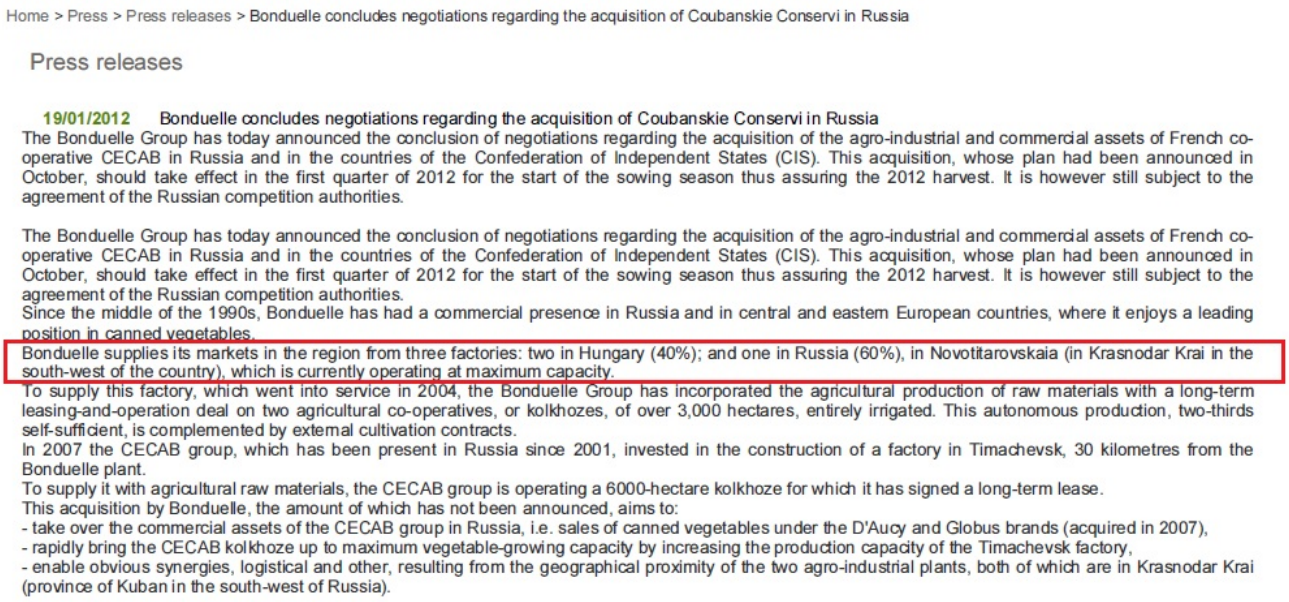
Allens is a family business created in 1926 in Arkansas (its head office is in Siloam Springs), which originally specialised in canned vegetables. In 2006 Allens entered the frozen vegetable segment by acquiring the Birds Eye industrial sites dedicated to the distributor's own brand products. In 2011 the Allens Group's sales of frozen vegetables represented a volume of around 150,000T in the USA, with 40% going to the General Public, 25% to Foodservice and 35% to industrial sales.
Until now, Bonduelle North America (head office in Montreal), the leader in canned and frozen vegetables in Canada under distributors' own brands and under its own labels (Bonduelle, Arctic Gardens, etc.) with over de 335,000T of vegetables grown in Quebec and Ontario, exported 30% of its production to the United States, mainly as frozen produce via the Foodservice networks. This acquisition will not only allow it to reinforce the growth of its sales but will also be advantageous in terms of exchange rate risks (better balance of productions and sales in US dollars) and the balancing of climate-related risks.

The Bonduelle Group, whose head office is situated in Villeneuve d'Ascq in northern France, is the world leader in prepared vegetables (canned, frozen, dehydrated, bagged salads in sachets and delicatessen products). It operates 42 production sites in Western Europe, Poland, Hungary, Russia, Canada and Brazil, generates a turnover of €1,726 million and employs 7,250 permanent employees.

With this acquisition, the Bonduelle Group becomes one of the main players in prepared vegetables in North America and pursues its growth outside of the European Union.

Figure A-1: Press Release on US Operations, Bonduelle.

The second press release describes the firm's operations in Eastern Europe. It makes clear that it serves the region primarily from its production sites in Hungary and Russia, rather than from France. The press release was downloaded from `http://www.bonduelle.com/en/press/press-releases/92/bonduelle-concludes-negotiations-regarding-the-acquisition-of-coubanskie-conservi-in-russia.html#axzz290fyH3S5`



Home > Press > Press releases > Bonduelle concludes negotiations regarding the acquisition of Coubanskie Conservi in Russia

Press releases

19/01/2012 **Bonduelle concludes negotiations regarding the acquisition of Coubanskie Conservi in Russia**

The Bonduelle Group has today announced the conclusion of negotiations regarding the acquisition of the agro-industrial and commercial assets of French co-operative CECAB in Russia and in the countries of the Confederation of Independent States (CIS). This acquisition, whose plan had been announced in October, should take effect in the first quarter of 2012 for the start of the sowing season thus assuring the 2012 harvest. It is however still subject to the agreement of the Russian competition authorities.

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Since the middle of the 1990s, Bonduelle has had a commercial presence in Russia and in central and eastern European countries, where it enjoys a leading position in canned vegetables.

Bonduelle supplies its markets in the region from three factories: two in Hungary (40%); and one in Russia (60%), in Novotitarovskaia (in Krasnodar Krai in the south-west of the country), which is currently operating at maximum capacity.

To supply this factory, which went into service in 2004, the Bonduelle Group has incorporated the agricultural production of raw materials with a long-term leasing-and-operation deal on two agricultural co-operatives, or kolkhozes, of over 3,000 hectares, entirely irrigated. This autonomous production, two-thirds self-sufficient, is complemented by external cultivation contracts.

In 2007 the CECAB group, which has been present in Russia since 2001, invested in the construction of a factory in Timachevsk, 30 kilometres from the Bonduelle plant.

To supply it with agricultural raw materials, the CECAB group is operating a 6000-hectare kolkhoze for which it has signed a long-term lease.

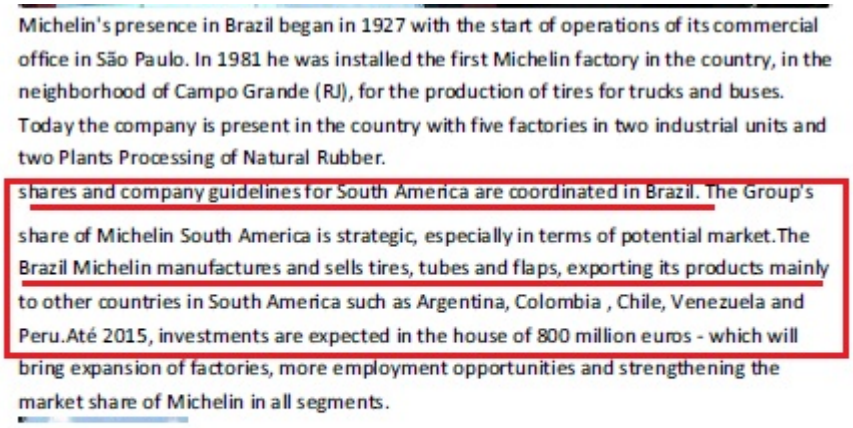
This acquisition by Bonduelle, the amount of which has not been announced, aims to:

- take over the commercial assets of the CECAB group in Russia, i.e. sales of canned vegetables under the D'Aucy and Globus brands (acquired in 2007),
- rapidly bring the CECAB kolkhoze up to maximum vegetable-growing capacity by increasing the production capacity of the Timachevsk factory,
- enable obvious synergies, logistical and other, resulting from the geographical proximity of the two agro-industrial plants, both of which are in Krasnodar Krai (province of Kuban in the south-west of Russia).

Figure A-2: Press Release on Eastern European Operations, Bonduelle.

A.2 Michelin

The following figure describes the operations of tire manufacturer Michelin in South America. Panel (a) was downloaded from the firm's Brazilian subsidiary, `http://www.michelin.com.br/sobre-nos.html` whereas panel (b) was downloaded from the firm's Argentine subsidiary, `http://www.michelin.com.ar/wps/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLN4i3dAPJgFku-pGoIsam6CzcVH1v_QD9gtzQ0IhyR0UAE1oM8A!!/delta/base64xml/L3dJdyEvUUd3QndNQSEvNElVRS82XzBfOUY!?channelId=84772f94426c5010VgnVCM1000001e65600aRCRD` on Oct. 12, 2012. Both make clear that Michelin's South American operations are primarily directed from the firm's affiliate in Brazil rather than from France. The Brazilian affiliate is responsible not only for supplying the firm's wholesale affiliates in the region but also for marketing operations in neighboring countries.



(a)

(b)

Figure A-3: Operations of Michelin South America

A.3 Nexans

The following two figures focus on the operations of Nexans. The first figure is taken from the group's Dutch affiliate, and was downloaded from `http://www.nexans.nl/eservice/Netherlands-nl_NL/navigate_148356/Nexans_Nederland.html` on Oct. 3, 2012. The second was obtained from the firm's Swedish affiliate. The picture in Panel (a) was downloaded from `http://www.nexans.se/eservice/Sweden-en/navigate_153122/Nexans_in_Sweden.html` and the one in Panel (b) was downloaded from `http://www.nexans.se/eservice/Sweden-en/navigate_153128/Locations.html` on Oct. 11, 2012. Both state that the Swedish affiliate is largely responsible for managing the group's

operations in the Baltic and Scandinavian countries.

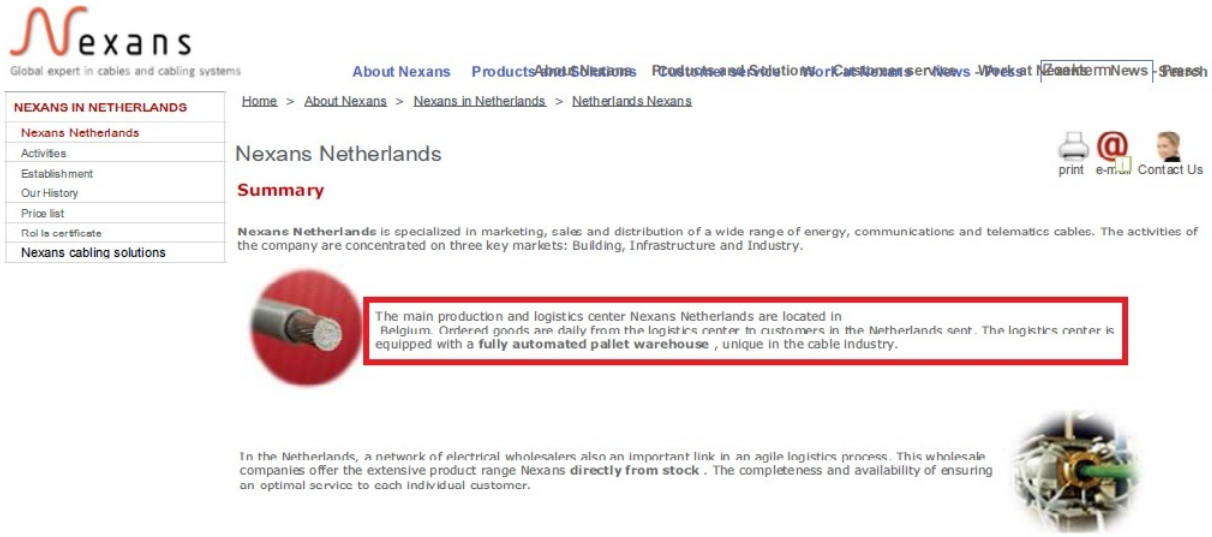


Figure A-4: English translation of the website of the Dutch affiliate of Nexans.

(a)

(b)

Figure A-5: Operations of Nexans' Swedish Affiliate

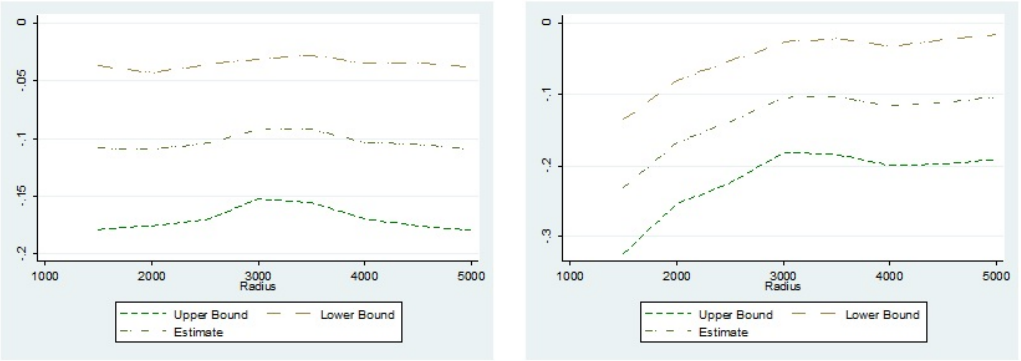
B Additional Estimation Results

Table B-1 presents estimation results for a firm's entry decision when $M_f(n, n')$ is varied from 1500-5000 km. Unlike Table 5 in the main text, macro variables are used rather than country fixed effects. Figure B-1 plots the coefficient estimates along with the upper and lower bounds of the 95% confidence interval for $M_f(n, n')$ from Table D-1.

Table B-1: Firm Entry Decision, Radii 1500-5000km

Firm Choice	Variable	Radius 1500 km	Radius 2000 km	Radius 2500 km	Radius 3000 km	Radius 3500 km	Radius 4000 km	Radius 4500 km	Radius 5000 km
Man. Affiliate	$M_f(n, n')$	-0.108***	-0.109***	-0.104***	-0.092***	-0.092***	-0.103***	-0.105***	-0.109***
		(0.036)	(0.034)	(0.035)	(0.031)	(0.033)	(0.034)	(0.036)	(0.036)
	Distance	-0.343***	-0.349***	-0.354***	-0.352***	-0.345***	-0.333***	-0.333***	-0.329***
		(0.122)	(0.121)	(0.120)	(0.118)	(0.117)	(0.116)	(0.116)	(0.116)
	Tariff	0.006	0.005	0.005	0.007	0.007	0.007	0.007	0.007
		(0.010	(0.10)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
	Import Fr.	-0.100	-0.102	-0.113	-0.123	-0.124	-0.124	-0.122	-0.118
		(0.088)	(0.087)	(0.086)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)
	GDP	0.416***	0.412***	0.418***	0.422***	0.422***	0.419***	0.419***	-0.420***
		(0.078)	(0.078)	(0.078)	(0.079)	(0.079)	(0.079)	(0.079)	(0.079)
	GPC	-0.425***	-0.430	-0.428***	-0.425***	-0.425***	-0.425***	-0.428***	-0.432***
		(0.105)	(0.107)	(0.107)	(0.107)	(0.107)	(0.108)	(0.108)	(0.108)
	Contiguity	-0.201	-0.263	-0.281	-0.278	-0.271	-0.284	-0.291	-0.299
		(0.235)	(0.235)	(0.236)	(0.233)	(0.233)	(0.233)	(0.234)	(0.234)
	SMP	-0.509*	-0.476*	-0.465*	-0.461*	-0.453*	-0.425	-0.426	-0.419
		(0.276)	(0.269)	(0.267)	(0.266)	(0.266)	(0.267)	(0.266)	(0.265)
	Colony	0.751***	0.729***	0.714***	0.695***	0.706***	0.701***	0.692***	0.682***
		(0.202)	(0.201)	(0.200)	(0.199)	(0.199)	(0.200)	(0.199)	(0.199)
	Pr. Credit	-0.091	-0.092	-0.098	-0.089	-0.091	-0.091	-0.096	-0.106
		(0.110)	(0.111)	(0.113)	(0.111)	(0.111)	(0.110)	(0.111)	(0.113)
No Affiliate	$M_f(n, n')$	-0.230***	-0.167***	-0.138***	-0.104***	-0.103**	-0.116***	-0.111**	-0.104**
		(0.048)	(0.044)	(0.043)	(0.039)	(0.041)	(0.042)	(0.044)	(0.044)
	Distance	0.379***	0.390***	0.395***	0.405***	0.411***	0.423***	0.424***	0.427***
		(0.106)	(0.106)	(0.106)	(0.105)	(0.105)	(0.105)	(0.105)	(0.105)
	Tariff	0.030***	0.030***	0.032***	0.034***	0.034***	0.034***	0.034***	0.034***
		(0.007)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
	Import Fr.	-0.135*	-0.126*	-0.130*	-0.133*	-0.134*	-0.133*	-0.129*	-0.122
		(0.076)	(0.075)	(0.075)	(0.076)	(0.076)	(0.076)	(0.076)	(0.076)
	GDP	-0.678***	-0.671***	-0.661***	-0.655***	-0.655***	-0.658***	-0.657***	-0.656***
		(0.054)	(0.055)	(0.055)	(0.055)	(0.055)	(0.056)	(0.056)	(0.056)
	GPC	-0.183*	-0.193*	-0.194*	-0.192*	-0.193*	-0.192*	-0.195*	-0.198*
		(0.105)	(0.106)	(0.106)	(0.105)	(0.106)	(0.106)	(0.106)	(0.106)
	Contiguity	-1.053***	-0.995***	-0.959***	-0.905***	-0.896***	-0.907***	-0.894***	-0.879***
		(0.212)	(0.215)	(0.215)	(0.214)	(0.214)	(0.213)	(0.214)	(0.213)
	SMP	0.547**	0.502**	0.481**	0.451**	0.455**	0.486**	0.468**	0.454**
		(0.219)	(0.217)	(0.217)	(0.216)	(0.217)	(0.218)	(0.218)	(0.218)
	Colony	0.299	0.274	0.261	0.251	0.262	0.255	0.250	0.248
		(0.212)	(0.210)	(0.209)	(0.207)	(0.209)	(0.208)	(0.208)	(0.208)
	Pr. Credit	-0.350***	-0.338***	-0.338***	-0.324***	-0.324***	-0.324***	-0.328***	-0.333***
		(0.102)	(0.103)	(0.104)	(0.102)	(0.102)	(0.102)	(0.103)	(0.105)
	Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Indusry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Obs	6380	6380	6380	6380	6380	6380	6380	6380
	Firms	110	110	110	110	110	110	110	110
	Log PLH	-2926.80	-2933.85	-2938.02	-2941.72	-2942.00	-2940.39	-2940.83	-2941.09
	Pseudo R^2	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41

*, ** and *** denote significance at the 10, 5 and 1% level.
Standard errors are clustered at the firm level and adjusted for heteroskedasticity.
Estimation through multinomial logit. Base outcome: establishment of a wholesale affiliate.
GPC = GDP per capita.



(a) Manufacturing-Wholesale Affiliate Trade-off (b) Wholesale Affiliate-No Affiliate Trade-off

Figure B-1: Coefficient Estimates and 95% Confidence Intervals for $M_f(n, n')$. Radius: 1500-5000 km.