



## Local complementary inputs as drivers of entry mode choices: The case of US investments in Brazil



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### ABSTRACT

The theory of entry mode choice has modeled that choice as solely determined by the foreign investor. Hennart's bundling model, on the other hand, argues that foreign entry into a host market involves the bundling of intangibles contributed by the foreign investor with local complementary inputs contributed by local actors, and that the chosen mode of entry will be the one that maximizes the joint gains of both parties. That chosen mode will depend on the relative efficiency of the various markets on which intangibles and complementary assets can be bundled. We test the model on a sample of US entries into Brazil. We find that the number of available suppliers of local complementary assets and the degree of concentration of the Brazilian industry are significant determinants of the choice US investors make between joint ventures and wholly-owned subsidiaries, and between greenfields and acquisitions, thus providing support for the model.

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## 1. Introduction

The modes chosen by foreign investors to enter a foreign market, i.e. whether they take full ownership of their foreign affiliate or whether they share ownership with local firms, and whether they enter with a de novo investment (a greenfield subsidiary) or through an acquisition, have been a major topic in the international business (IB) literature. Some have even argued that we have now a good knowledge of the drivers of these modes, and that recent work has been making only marginal contributions (Shaver, 2013). Yet in an article published in the 40th anniversary issue of the Journal of International Business Studies, Hennart (2009) argues that the entry mode literature needs to be re-evaluated. According to him, the literature has modeled entry

mode as solely dependent on the preferences of the foreign investor. Yet successful manufacture and sale in a foreign market requires that the foreign investor bundle its imported assets with complementary local inputs, such as land, raw materials, labor, utilities, permits, and distribution. These inputs have owners, whose interests and motives may be relevant to the entry mode choice. While the literature has modeled the entry mode as resulting from a unilateral decision by the foreign investor, Hennart argues that it should be seen as the outcome of a joint decision between the foreign investor and the owners of these local inputs. His model suggests that a crucial variable in that decision is the efficiency of alternative local markets available to the foreign investor for accessing these complementary inputs.

The neglect of the potential role played by owners of local complementary inputs may account for the lack of consistent empirical support for some of the predictions of the extant literature. Anderson and Gatignon's (1986) hypothesis that foreign investors with highly proprietary assets would choose a wholly-owned subsidiary (a WOS) over a joint venture (a JV) was not supported by Gomes-Casseres (1989) in his study of US firms

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**Table 1**  
New US affiliates in Brazil, 2005–2010.

Ownership of subsidiary	> 95%	>5% <95%	Total
Greenfield	Wholly-owned greenfield (150)	Greenfield joint venture (31)	All greenfields (181)
Acquisition	Full acquisitions (100)	Partial acquisitions (16)	All acquisitions (116)
Total	All WOS (250)	All JVs (47)	All entries (297)

investing abroad and by Hennart (1991) in the case of Japanese firms entering the United States, while Kogut and Singh (1988) found that R&D intensive foreign investors chose JVs. Similarly, Brouthers and Brouthers (2000) and Padadmadhan and Cho (1999) found support for Vermeulen and Barkema's (2001) hypothesis that foreign investors with extensive international experience will choose greenfields over acquisitions, while Andersson and Svensson (1994), Caves and Mehra (1986), Fosgren (1989) and Harzing (2002) found that internationally experienced foreign investors were more likely to choose greenfields. These contradictory results may have been due to the neglect of the role played in the entry mode by local owners of complementary inputs.

This paper provides, as far as we know, the first test of Hennart's model. To the best of our knowledge, ours is also the first large-sample econometric study of the entry mode chosen by foreign firms investing in Brazil. We look at US entries into Brazil between 2005 and 2010. Focusing on one investor and one host country allows us to control for cultural differences between investors and differences in host country conditions. The United States is a major investor into Brazil. Brazil is an emerging market in which we would expect some markets for complementary inputs to be inefficient. We proxy the difficulties faced by foreign investors in obtaining such inputs by estimating the number of key suppliers for each new US affiliate established in Brazil. We find support for our hypothesis that when the number of potential suppliers is low, the chance that entry will be with a JV rather than with a WOS is high. Likewise, the more concentrated the industry entered, the more likely the entry will be through a JV rather than through a WOS, and through an acquisition rather than through a greenfield. Some variables that have taken contradictory signs in previous studies, for example the investor's R&D intensity and its international experience, become insignificant when we enter the difficulty of accessing complementary local inputs.

The next sections makes the case that owners of complementary local inputs have been omitted from models that predict the choice of entry modes, and explains why one would expect them to play a role in that choice. We then present our hypotheses, our data, our methodology, and our results. We follow with our conclusions, in which we derive some implications for further research on entry modes.

## 2. Theory and hypotheses

### 2.1. Complementary local inputs

When entering a foreign market, foreign investors must make a series of decisions. They must decide whether to contract with a local firm (for example to license their knowledge to it) or to set up a foreign subsidiary. If they decide to set up a foreign subsidiary in the target market, they must decide whether to keep full equity of the subsidiary (i.e. enter through a WOS) or to share it with another firm, for example through a JV. A separate decision facing foreign investors is whether to bundle by themselves the necessary inputs to set up a subsidiary (i.e. set up a greenfield), or to buy an existing firm (to make an acquisition). In the rest of the paper we follow Brouthers and Hennart (2007) and define WOSs as both fully-owned greenfields and full acquisitions, and JVs as greenfield JVs

and partial acquisitions (see Table 1). By acquisitions we will mean both full and partial acquisitions, and by greenfields both greenfield JVs and greenfield WOSs.

The IB literature has generally modeled the choice between entry with a WOS and entry with a JV, and that between entry with a greenfield affiliate and entry with an acquisition, as unilaterally determined by the foreign investor. Anderson and Gatignon (1986), one of the most cited article on entry modes, states that foreign investors will choose a WOS when they have considerable knowledge of the target market, but will opt for a JV when they want to reduce their resource commitment because they see the target market as risky. They add that foreign investors will set up a WOS if they want to exploit proprietary assets because this will allow them to limit their unauthorized diffusion. Brouthers (1995: 11) succinctly summarizes Anderson and Gatignon's model in these words: "In selecting the appropriate entry mode firms have to answer two questions: (1) what level of resource commitment are they willing to make? (2) What level of control over operations do they desire?"

Other IB models of the evolution of entry modes in a host country also see the process as essentially determined by the foreign investor. The Uppsala internationalization process model (Johanson & Vahlne, 1977, 1990; Johansen & Vahlne, 2009) predicts that the mode of entry chosen by foreign investors will progress from a JV to a WOS as they gain additional experience from their current activities in the host market. The organizational learning perspective (Barkema and Vermeulen, 1998; Vermeulen & Barkema, 2001; Padadmadhan & Cho, 1999) argues that a firm's own past experience determines its choice between greenfields and acquisitions. In none of these frameworks do owners of complementary assets seem to play any active role in the foreign investor's decision. Which entry mode to choose is the foreign investor's sole prerogative.

The preceding frameworks do not explicitly recognize that foreign investors typically choose to locate production in a target country (as opposed to export to that country from their home country) when the local complementary inputs they need are more efficiently obtained in the target country than at home. These inputs include land, raw materials, labor, utilities, government permits, and access to customers. Since these inputs have owners, it seems strange to keep them out of the picture. The neglect of the potential role these owners might play in the determination of entry mode probably stems from the particular treatment of complementary local inputs in one of IB's dominant model, the OLI paradigm (Dunning, 1988).

The OLI paradigm does take local complementary inputs into account. It states that firms will serve foreign markets through foreign production when the foreign investor's ownership advantage (O advantage), for example its technological innovation, cannot be easily sold or rented to local firms and is best exploited in conjunction with local factors of production. Dunning calls these complementary local inputs 'location advantages' (L advantages). He argues that for foreign production to take place, O advantages must be poorly tradable (i.e. internalization of these advantages is required) and they are more profitably bundled with local rather than home country complementary inputs. But while the transactional characteristics of O advantages are at the center of

his OLI model, local complementary inputs (L advantages) are expressly assumed to be freely available to both local firms and foreign investors. In the latest version of the model (Dunning & Lundan, 2008: 96) L advantages are said to be 'specific to a particular location... but available to all firms'. If local complementary inputs are freely available to one and all on perfectly competitive markets, then foreign investors do not have to take their owners into account when making their choice between a WOS and a JV or a greenfield and an acquisition.

To sum up, extant theory either ignores the fact that foreign investors need to access local complementary inputs to operate in the target market, or in the case of OLI, explicitly assumes that these inputs are available to foreign investors on perfectly competitive markets. In both cases procuring these local complementary inputs does not influence the foreign investor's mode of entry.

In the real world, however, the market transfer of both the intangibles held by foreign investors and the complementary local inputs held by local firms is subject to various levels and types of imperfections. The degree of imperfection will depend on the characteristics of those inputs and on the level of institutional support for their markets.

Before we look at how the imperfection of the markets for complementary inputs affect modes of entry, it is important to understand that a foreign investor can use various markets to access these complementary inputs (Hennart, 1988). For example, a foreign investor who needs to obtain land to build a plant can purchase it on the market for assets (the market for land), can rent it on the market for the services of assets (the rental market), or can purchase a firm that holds real estate (on the market for firms). If one market is inefficient, foreign investors can switch to a more efficient one. For example, if no land is available on the real estate or rental market, a foreign investor can indirectly acquire it on the market for firms. If all markets fail, then the foreign investor must integrate into the activity, i.e. extend the scope of the subsidiary. As we will show, which method the foreign investors uses to bundle the complementary assets will determine their mode of entry.

To access complementary local inputs, foreign investors must know where they can be found and who owns them, must be able to contract for them, and to enforce the agreement reached. The IB literature has argued in general terms that foreign investors are at a disadvantage in this regard compared to their local counterparts. Foreign investors suffer from a liability of foreignness because they must acquire information about the economic, social, legal and cultural aspects of the target country which their local rivals accumulate just by being there. Alien firms are also frequently targets of discrimination by local governments (Zaheer, 1995).

Here we are focusing on the specific problems of accessing complementary inputs. While the situation varies from country to country, there are good reasons to believe that the task of lining up complementary local inputs is particularly arduous in emerging markets. Emerging markets have fewer market-supporting institutions than developed countries. While in more advanced countries foreign investors can rely on market research specialists and government statistics for reliable data on the size and

characteristics of the potential customer pool, and on their tastes and purchase habits, such reliable sources of information are harder to find in emerging markets. Distribution in emerging markets is often inefficient and fragmented, and logistics inadequate. There is often little data on the creditworthiness of final and intermediate customers and on that of potential suppliers. Legal enforcement in most emerging markets is also often poor (Khanna & Palepu, 2010). Rules and regulations are often opaque and selectively enforced to the detriment of foreign firms. Faced with this lack of formal structures, local firms often use relationships as a substitute source of information and means of enforcement. Because foreign investors are by definition outside these networks of reciprocal relationships, they tend to be cut off from valuable information. They may also not be trusted as commercial partners since they do not have a track record and are unable to reciprocate favors (Li, Park, & Li, 2004). All of this makes procuring complementary assets difficult for foreign investors entering emerging markets.

Many local firms in emerging markets have also benefited from protectionist policies established by their governments. Until the 1990s, the governments of many emerging countries (including Brazil) followed a policy of self-sufficiency. They imposed high import duties and provided strong incentives to local producers. This allowed local companies to gain a secure foothold in many industries (Ramamurti, 2009). Hence in many emerging markets local companies have established a strong hold on domestic distribution (Hennart, 2012).

In many emerging markets governments have also nurtured state-owned companies which have become local champions. In Brazil, for example, Vale and Petrobras were given exclusive or preferential access to natural inputs, while Embraer was provided with substantial research funds and government contracts. While some of these firms have been privatized, many have maintained their domestic monopoly position.

Consequently, markets for many complementary local inputs in many emerging countries are imperfect. Formal markets are undeveloped or missing and the number of potential suppliers of complementary local inputs is often limited. What does that mean for the modes of entry chosen by foreign investors? In the next section we introduce a model that does explicitly take into account imperfect markets for complementary local inputs and derives implications for the entry modes that will be used by foreign investors.

## 2.2. A bundling model of modes of entry

Table 2 presents Hennart's (2009) bundling model of modes of entry. The model shows the optimal arrangement for a foreign firm entering a target market. To keep things manageable, the model features only two actors, the foreign investor, who is bringing knowledge it wants to exploit in the target market, and a local firm which owns complementary local inputs, such as distribution.

The starting point of the model is OLI's assumption that the successful manufacture and sale of a product in a target market

**Table 2**  
Optimal mode of foreign market entry.

		Knowledge assets held by the foreign investor	
		Column 1	Column 2
		Easy to transact	Difficult to transact
Complementary assets held by local owners	Row 1 Easy to transact	1. Indeterminate	3. Wholly-owned affiliate of the foreign investor
	Row 2 Difficult to transact	2. Wholly-owned operations of local firm	4. Joint venture between foreign investor and local firm

necessitates bundling two types of inputs, intangibles brought in by the foreign investor, and local complementary inputs held by local firms. The actual mode of entry chosen results from the form taken by these two transactions, the one transferring intangibles and the other transferring complementary local inputs.

The model predicts that the chosen mode of entry will be the one that maximizes the total profits generated by the entry. It assumes that this optimal mode of entry is the only one that will survive in the medium to long run because inequitable arrangements will not be agreed upon by the parties, while inefficient ones will succumb to the pressures of competition.

In the model, the knowledge held by the foreign investor can be either easy or hard to transact on markets. Note that 'easy to transact' means either that the input is protected by strong property rights and is hence easy to license, or that it is not protected at all and easy to copy. Similarly, the complementary local resource held by the local firm, here distribution, can be either easy or hard to transact on the market. Distribution is hard to access when, for example, competitors have vertically integrated into it and enjoy a dominant position. If the foreign investor cannot acquire that firm, and if vertical integration into distribution is difficult because the foreign investor cannot find qualified personnel and adequate facilities, then it would have to rely on a local competitor to distribute its products. This exposes the foreign investor to possible hold-up. At the minimum, the built-in conflict of interest is likely to reduce the efficiency with which its products are distributed.

The logic of the model, derived from property rights theory (Eswaran & Kotwal, 1985), is that the most efficient arrangement is the one which minimizes the sum of monitoring costs. Hence when the behavior, or the output, of one party is difficult to assess or measure, that party will not be able to transact on a fixed term contract with the other party, and will have to accept to get paid through equity, that is to be paid from what is left after fulfilling all fixed commitments. In other words, the party with the most difficult to measure behavior or output will be the owner of the venture. When the behavior or output of both interacting parties is equally hard to monitor or measure, they both need to own the venture. Then we have a JV.

Let's focus on column 1 of Table 2. Column 1 corresponds to the case where the knowledge held by the foreigner is easy to transact. This is, for instance, when the knowledge held by the foreigner has strong intellectual property protection and is difficult to copy. Then no foreign direct investment takes place. Instead, if local complementary inputs are difficult to transact (cell 2), the optimal arrangement will be one where foreign firms will exploit their knowledge in the target market by licensing local owners of complementary inputs.

In column 2 the knowledge held by the foreign investor is difficult to transfer to firms in the target market through market processes, for example because it is tacit (and hence difficult to patent) and difficult to copy. In that case, the most efficient way to transfer it is through equity, that is through foreign direct investment. In cell 3, the local complementary inputs held by the local firm, here distribution services, are easy to access by the foreign investor, for example because there are many potential distributors eager to distribute the foreign investor's products. If knowledge is hard to transact, but distribution is easy to access, then the owner of knowledge (the foreign firm) will set up a subsidiary in the target market, and will obtain distribution by contracting with distributors on the market for distribution services, by setting up its own distribution network and hiring employees on the labor market, or by taking over firms with distribution facilities on the market for firms. Because the behavior/output of the foreign investor is hard to monitor or measure, but that of the distributor can be easily monitored and

measured, it makes sense to give full equity to the party with hard-to-measure performance. The outcome will be a WOS of the foreign investor (a wholly-owned greenfield or a full acquisition). This is the case featured in OLI.

If the market for distribution is inefficient, the foreign investor may find it impossible or risky to rely on market contracts to access it, and an efficient solution will be to reduce the probability of being held up by a distributor by providing him an incentive to perform. An efficient way to do so is to give that party a share of the equity in the subsidiary (Hennart, 1988). The foreign investor can set up a greenfield JV with the local owner of distribution services, or it can make a partial acquisition of a local firm with distribution assets. For example, Kraft Foods entered the Brazilian market by setting up a greenfield JV with Sadia SA, a major producer of dairy products with an extensive national distribution network. Kraft entered into the JV to access Sadia's national distribution network. Similarly, Pfizer acquired a 40% stake in Laboratório Teuto Brasileiro SA (Teuto), a Goiás-based manufacturer of pharmaceutical products. Pfizer wanted to accelerate its penetration of the Brazilian market by taking a stake in a local player with an established distribution network.

In both cases, the rationale for entering with a JV is the need to provide incentives to the owners of complementary local inputs. Giving these owners a stake in a new greenfield JV enlists their help in setting up and initially running the JV. Leaving a partial stake to the owners of an acquired firm motivates its managers to continue to contribute to the success of the acquired firm, for example by sharing their tacit knowledge of the host country with the acquirer (Chari & Chang, 2009; Hennart, 1991).

The model therefore predicts that a foreign investor will keep full equity (will choose a WOS) if its intangibles are difficult to sell on the market while access to complementary local inputs can easily be obtained by purchasing assets, contracting for the services of assets, or purchasing firms that hold the assets. If, on the other hand, the market for complementary local inputs is inefficient (because the market for assets, for the services of assets, or for the firms owning the assets is inefficient), then the foreign investor will choose shared equity (a greenfield joint venture or a partial acquisition). If we are considering cases where the foreign firm enters through direct investment, then we are in the right column of Table 1, and the choice between WOS and JV will depend only on the efficiency of the market for the complementary local assets they need. This leads us to our first hypothesis:

**H1.** Foreign investors will choose a JV over a WOS if the market for the complementary local inputs they need is inefficient.

What determines the choice between acquisition and greenfield entry? Hennart (2009) suggests that the choice depends in part on the relative efficiency of obtaining inputs in disembodied form on the market for assets and services of assets vs. that of obtaining them embodied in firms on the market for firms. Whenever complementary local inputs can be accessed in disembodied form in the market for assets or in that for asset services, the foreign investor can purchase the assets or the services of the assets and bundle them into a greenfield WOS or JV. In some cases, however, assets and asset services are embodied in firms. Government permits, for example, may be attached to firms and may not be tradable. Then the only way to obtain the permits is to purchase the firm that holds them. Likewise if customers have made investments which are specific to a particular supplier, then they may be highly reluctant to switch suppliers. The best way to access customers is then to purchase a firm that has established relationships with customers.

A foreign investor who needs to access assets embedded in firms has to do it by buying the firm. The feasibility of this option

depends on the efficiency of the market for firms. There are many reasons why that market may be inefficient. First, for acquisitions to take place there must be acquisition targets. Second, firms which are not listed on stock exchanges and which have concentrated ownership are not always easy to acquire (Healy & Palepu, 1993). In most emerging markets, for example Brazil, many firms are state-owned, and quite a number are owned by families who want to pass ownership to the heirs, and are therefore unwilling to sell. Governments also sometimes put restrictions on acquisitions of local firms by foreigners. Lastly, the efficiency of obtaining assets through acquisitions depends on the extent to which the assets needed are commingled with unneeded assets. If the assets that the acquirer needs are only a small part of the assets held by the target, the acquirer will have to sell the non-needed assets. This can be expensive if the non-needed assets cannot be easily separated from the needed ones, i.e. if they are not modular. Hennart (2009) gives the example of Japanese investors in the United States. Their main advantage was superior quality obtained through superior human resource practices. This advantage was systemic in the sense that it required a specially trained workforce and often a specific plant layout (Liker, Fruin, & Adler, 1999). Retraining long-tenured US workers was difficult. Yet firing them and replacing them by more trainable new hires would have been politically difficult as well. Because a substantial part of the acquired inputs, i.e. the labor force, was unwanted, but difficult to dispose of, entry through acquisition proved to be a suboptimal choice in those sectors where the Japanese advantage was based on superior labor practices. On the other hand, US food products manufacturers used acquisitions to enter Eastern Europe in the 1980s and 1990s because the advantage they wanted to exploit was their superior skill in advertising and brand management. This advantage was modular, in the sense that it could just be added to the manufacturing facilities and locally established products and distribution networks of the acquired firms without having to make significant changes to them (Estrin, Hughes, & Todd, 1997; Marinov & Marinova, 1998).

Hence our second hypothesis

**H2.** Foreign investors will choose greenfields over acquisitions if complementary assets can be more efficiently accessed in the market for assets or asset services than in the market for firms.

### 3. Research design

#### 3.1. Data

We test our hypothesis on a sample of US direct investments in Brazil made between 2005 and 2010. Focusing on investments made by firms from one home country allows us to control for differences in the cultural background of investors. We chose the US because that country is a large investor into Brazil. Focusing on investments made into one host country controls for host country differences in socio-political environment and in policies and practices concerning foreign investors. We chose Brazil because that country is a large host market. It is also an emerging market where access to complementary local inputs is often difficult, and hence where the need to provide incentives to their owner is likely to affect entry mode choices.

Brazil has many of the features mentioned in our description of the difficulties facing foreign investors in accessing local complementary inputs. Domestic firms were protected by high import tariffs until the early 1990s, allowing some of them to build strong brands and distribution networks (Fleury & Fleury, 2009). The Brazilian state set up state-owned companies such as Petrobras, Vale and Embraer and, while they are now privatized, they have kept strong monopoly positions. Legal enforcement is poor, and

**Table 3**

New US affiliates in Brazil, 2005–2010, by industry of affiliate.

NAICS	Industries	Number	%
311	Food	29	9.76
312	Beverage and tobacco products manufacturing	23	7.74
313	Textile mills	1	0.34
314	Textile products mills	1	0.34
315	Apparel manufacturing	6	2.02
321	Wood products manufacturing	1	0.34
322	Paper manufacturing	8	2.69
323	Printing and related support activities	4	1.35
324	Petroleum and coal products manufacturing	10	3.37
325	Chemical manufacturing	43	14.48
326	Plastics and rubber products Manufacturing	13	4.38
327	Nonmetallic mineral products manufacturing	4	1.35
331	Primary metal manufacturing	5	1.68
332	Fabricated metal products manufacturing	13	4.38
333	Machinery manufacturing	25	8.42
334	Computer and electronic products manufacturing	48	16.16
335	Electrical Eqmt., appliances, and components Mfg.	10	3.37
336	Transportation equipment manufacturing	31	10.44
339	Miscellaneous products manufacturing	22	7.41
Total		297	100.00

Source: Thomson Reuters, RENAI.

courts have enormous backlogs, hence relationships are crucial to do business (Amado & Vinagre Brasil, 1991). As argued earlier, economies where relationships are important are difficult for new foreign investors to penetrate because they are by definition outsiders. A plethora of rules and regulations makes doing business in Brazil difficult if one obeys them all (Estrin & Prevezer, 2011). Brazil ranks 116 in the World Bank “ease of doing business” ranking, below Russia (92) and China (96)<sup>1</sup>. Navigating the Brazilian regulatory landscape is an art practiced by the locals, but which takes time for foreigners to learn (Amado & Vinagre Brasil, 1991)<sup>2</sup>.

From the SDC database published by Thomson Reuters we obtained data on US acquisitions of Brazilian firms and on US JVs with Brazilian firms in Brazil. SDC lists 451 acquisitions between 2005 and 2010 of Brazilian companies by firms whose ultimate owners are US residents, and 42 greenfield JVs between Brazilian and U.S. firms. We obtained a list of greenfield investments by US firms in Brazil over the same period from the Brazilian National Network of Investment Information (RENAI), an agency responsible for tracking all greenfield investments in Brazil. We identified 322 greenfield projects by U.S. companies in Brazil between 2005 and 2010.

Our initial sample consists of 815 observations. Missing values for US parents forced us to exclude non-listed U.S. companies. We also excluded purely financial investments, such as those by private equity firms, because these investments have different motives. Subsidiaries with R&D expenditures higher than sales (i.e. high-tech startups) were also excluded. Lastly we excluded greenfield investments that were extensions of already existing facilities. This left us with 297 entries. Table 3 shows the distribution of the sample by the industry of the subsidiary.

#### 3.2. Methods

Because our dependent variables are categorical, we use binominal logistic regressions to test our hypotheses. The first model tests our hypothesis which predict the choice between WOS and JV by US firms entering the Brazilian market. In this model, the dependent variable takes a value of one for WOSs and zero for JVs. As in previous work (e.g. Gomes-Casseres, 1989), WOS affiliates are

<sup>1</sup> www.doingbusiness.org.

<sup>2</sup> Brazilians call it ‘jeitinho’, from ‘dar um jeito’, ‘find a way’.

**Table 4**  
Summary of variables and expected signs for full ownership and acquisition.

Variable name	Description	Expected sign (+ = encourages full ownership)	Expected sign (+ = encourages acquisition)
YEARS	Number of years the parent has been operating in Brazil.	+	
RD	R&D/net revenues of the parent	NS	?
UNRELATED	Is affiliate product the same as parent? (1 = no)	-	+
EXPER	Number of countries where parent has operations.		NS
GROWTH	Brazilian industry growth rate		+
CONC	Concentration ratio of target industry in Brazil.	-	+
FEW SUPPLIERS	Number of available suppliers for a given target (1 = few)	-	+

defined as those in which an American parent owns more than 95% of the equity, while JVs are those in which a American parents own between 5% and 95% percent of the equity.

The regression coefficients estimate the impact of the independent variables on the probability that entry will be WOS. A positive sign means that the variable increases the probability of WOS [ $\text{Prob.}(WOS)/\text{Prob.}(JV)$ ], and a negative one the opposite. We also calculate the exponential coefficients [ $e$  (Coeff.)] to measure the size of the effect of each independent variable.

The second logistic model estimates the impact of potential drivers on the probability of acquisition. The dependent variable takes a value of one for acquisitions and zero for greenfields. Table 1 shows the distribution of the observations in our sample (the number of observations in each category is in parentheses).

Table 4 summarizes the independent variables and their expected signs for each choice, WOS vs. JV, and acquisition vs. greenfield.

### 3.3. Main independent variables

#### 3.3.1. Difficulty in accessing complementary local inputs (CONC; FEW SUPPLIERS)

The level of difficulty experienced by US foreign investors in accessing complementary local inputs is measured by two variables, CONC and FEW SUPPLIERS.

CONC is the concentration ratio of the Brazilian industry entered by the US foreign investor. This variable measures the proportion of the labor force of a sector employed by the four largest firms in the sector and is analogous to the usual four firm concentration ratio (C4) based on output. Data was obtained from the Brazilian Institute of Geography and Statistics (IBGE). The higher the value of CONC, the more concentrated the local industry, and the more difficult it is for foreign investors to access complementary local inputs through contracts or through acquisitions of local firms.

Our second measure of the difficulty of accessing local complementary inputs is the number of suppliers available to each foreign investor (FEW SUPPLIERS). We assume that the market for local complementary inputs is inefficient if the foreign investor has three local suppliers or less for key inputs. In that case FEW SUPPLIERS is coded as one.

To build this variable, we perused multiple public sources, such as specialized magazines, industry association publications, company press releases, etc. We also conducted interviews with key informants. Appendix provides further details.

### 3.4. Other independent variables

#### 3.4.1. Knowledge assets (RD)

Anderson and Gatignon (1986) have argued that high R&D intensive foreign investors will prefer WOS as they can exploit their superior capabilities abroad by themselves. However, as we have argued, and as Table 2 shows, whether a foreign investor's

R&D intensity will lead it to choose a WOS or a JV depends on whether the complementary inputs the firm needs are or are not sold in efficient markets. If they are, the outcome will be a WOS. If they are not, it will be a JV. R&D intensity should have no impact on its own, and hence we predict that when the transactional properties of complementary local inputs are taken into consideration, the coefficient of R&D intensity will be insignificant.

What about the impact of R&D intensity on the choice between greenfield and acquisition entry? Hennart (2009) states it hinges on the type of technological advantage enjoyed by the firm. If that advantage is modular, i.e. can be superimposed to an acquisition target without much change to the target, then a R&D intensive foreign investor may choose to enter through an acquisition. If the technological advantage is systemic, in the sense that it must infuse all parts of the acquisition target, and its implementation would require major changes to it, then the firm will prefer to enter through greenfields. For that reason, the impact of a firm's R&D intensity on the choice between greenfield and acquisition is also ambiguous.

As in previous studies (e.g. Hennart, 1991), we measure the U.S. parent's technological intensity by its research and development expenditures as a percentage of its net revenue in the year preceding entry. Data were obtained from SDC, Bloomberg, and the website of the US parent.

#### 3.4.2. Parent experience (YEARS; EXPER)

One important input foreigners may lack when entering a new target country is a knowledge of its economic, social, cultural and political environment. That tacit knowledge is hard to purchase on the market, and hence the best way for a foreign firm to acquire it is through a JV. Giving a stake to a local firm encourages that firm to efficiently handle local affairs on behalf of the foreign investor. Foreign investors who have been operating in Brazil for some years may have accumulated a good knowledge of the country and may no longer need to enter into such JVs when they set up a new subsidiary, and may instead choose WOSs (Stopford & Wells, 1972). The Uppsala model puts forth a different argument but reaches the same conclusion: foreign investors with experience of the target country will tend to prefer, ceteris paribus, WOSs over JVs.

Like Hennart (1991) and Larimo (2003) we measure a foreign investor's experience with the target country by the number of years the US foreign investor has been operating in Brazil at the time of the focal entry (YEARS).

The second dimension of experience that has been considered by IB scholars is general international experience. Barkema and Vermeulen (1998) have argued that foreign investors with international experience are more likely to choose greenfields over acquisitions. They argue that by operating in many countries foreign investors accumulate a broad range of technological skills, and that they no longer need to make acquisitions to acquire additional skills. Hence they will prefer greenfield entry over acquisitions. Support for this prediction has been mixed (Dow and Larimo, 2011).

As we have seen above, Hennart's (2009) bundling theory, on the other hand, argues that the choice between greenfields and acquisitions depends on whether the intangibles that the foreign investor is bringing to the target market can be exploited through an acquisition, or must be exploited through a greenfield. This depends on whether the intangibles can be superimposed on an existing firm, or whether they require a complete restructuring of the acquisition, in which case entry will be more efficient through a greenfield, everything else constant. General international experience does not seem to weigh one way or the other, and should be equally beneficial to both modes. Hence we predict that this variable should have no significant impact on the greenfield vs. acquisition choice.

Like Vermeulen and Barkema (2001), Barkema and Vermeulen (1998), Kogut and Singh (1988) and Caves and Mehra (1986), we measure international experience (EXPER) by the number of countries where the foreign investor has operations in the year preceding entry.

Data on YEARS were obtained by comparing the year of entry of the affiliate (from SDC and RENAI) to the parent's first year of entry into Brazil, which we obtained from the website of the parent or of its Brazilian subsidiaries. We obtained data on EXPER from the websites of the parent and of its subsidiaries.

#### 3.4.3. Diversification (UNRELATED)

One important variable that has been shown to influence both the choice between WOS and JV and that between greenfield entry and acquisition is whether the entry is in the main industry of the US parent, or whether it constitutes a diversification. We have seen that JVs are entered to bundle assets that are difficult to transact on the market. Foreign investors who decide to invest in a foreign market in an industry other than their main industry will need to access the knowledge of how to operate in an industry. This knowledge is tacit, and hence difficult to obtain on the market. Obtaining it through a JV makes sense because a partner who holds equity has strong incentives to effectively transfer that industry-specific knowledge. Hence if the foreign investor is also bringing difficult to sell intangibles, the result will be a JV. Empirical evidence has confirmed this hypothesis: entries which are in a different industry than that of the parent are likely to take the form of JVs (e.g. Hennart, 1991).

The same argument also applies to the choice between acquisitions and greenfield entry. Industry-specific knowledge, being tacit, is difficult to obtain on the market. Acquiring a firm where it is embedded is generally more efficient (Hennart & Park, 1993). The extant empirical literature (e.g. Larimo, 2003) has shown that foreign investors whose investment is in a different industry than their main industry consistently chose acquisitions over greenfield.

Following Hennart (1991) and Larimo (2003) we enter into both regressions the variable UNRELATED which takes the value of one if the main product of the subsidiary is also produced by the parent,

and zero otherwise. We obtained data on the industry of the subsidiary and on that of the parent from SDC and RENAI.

#### 3.4.4. Opportunity cost of delaying entry (GROWTH)

In contrast to an acquisition, where entry is immediate since an acquisition target is usually a going firm, entering through a greenfield takes time, since the plant has to be built and production fine-tuned (Biggadike, 1979). Acquisitions are thus attractive when there is a high cost involved in waiting. The cost of waiting depends in part on how much sales would be lost by waiting. It is less costly to wait in industries in which demand is growing slowly than in those where it is growing fast. Telecom Italia entered Brazil by taking over the local operator AES Atimus so it could quickly use its infrastructure network. It was ready to pay a premium to reach the market ahead of its competitors.

Following Brouthers and Brouthers (2000), we enter the average growth rate of the industry entered by the foreign investor in the year immediately preceding entry. Data was obtained from the Brazilian Institute of Geography and Statistics.

Table 5 presents the correlation coefficients among the variables. Most are below levels for which multicollinearity would be a problem. The only high correlation are those between YEARS and EXPER, but this is not a problem since these variables do not enter the same models.

#### 3.5. Results

The results of the binomial logistic regression of the determinants of the choice between WOS versus JV are presented in Table 6. Model 1 reports the results for the base model including R&D, YEARS and UNRELATED. A WOS is coded 1, so a positive sign for the coefficient indicates that the variable increases the chances that the entry will take the form of a WOS. All variables take the predicted signs. As expected, RD, the US parent's R&D ratio, is not significant. As has been found in prior work (e.g. Hennart, 1991), the longer the experience of the US parent in the target country (YEARS), the higher the probability it will enter with a WOS. Also consistent with previous findings, (e.g. Pehrsson, 2008) we find that US parents who enter in an industry different from their main industry (i.e. for which UNRELATED is equal to 1) tend to enter with a JV.

Model 2 includes all independent variables. The model has a high overall fit and is significant at <0.0001. The addition of CONC and FEW SUPPLIERS improves the fit over model 1. All significant variables have the predicted signs with a high overall percentage of correct predictions (76.3%).

The sign of CONC, the concentration ratio of the industry entered, is significantly negative, suggesting that US parents choose JVs over WOS when entering a concentrated industry. Each increase of 1% in CONC reduces the chances of entry through WOS by 3.8%, keeping other variables constant. The sign of FEW SUPPLIERS is also significantly negative, indicating that US parents

**Table 5**  
Pearson correlations coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean	2.4038	32.3501	24.3144	0.1212	0.3131	2.3199	60.1750
Std Dev	3.3288	30.9027	20.2774	0.3269	0.4645	5.6038	57.5874
(1) RD		0.2236	-0.1016	-0.0219	-0.0449	0.0801	0.0045
(2) YEARS	0.2236		0.0998	-0.0507	-0.1013	0.1448	0.4645
(3) CONC	-0.1016	0.0998		0.0246	-0.1820	0.1099	-0.0518
(4) FEW SUPPLIERS	-0.0219	-0.0507	0.0246		0.3053	0.0278	-0.1021
(5) UNRELATED	-0.0449	-0.1013	-0.1820	0.3053		-0.0383	-0.0921
(6) GROWTH	0.0801	0.1448	0.1099	0.0278	-0.0383		0.0583
(7) EXPER	0.0045	0.4645	-0.0518	-0.1021	-0.0921	0.0583	

**Table 6**

Parameter estimates for binomial logistic regression model: Wholly-owned subsidiary (=1) versus joint venture (=0).

Variables	Model 1 (Base Model)	e (Coeff.)	P value	Model 2 (Compl. Local Assets)	e (Coeff.)	P value
Intercept	1.6007	4.957	<0.0001***	3.0052	20.191	<0.0001***
RD	0.0332	1.034	0.5662	-0.0043	0.996	0.9438
YEARS	0.0130	1.013	0.0164**	0.0151	1.015	0.0072**
UNRELATED (=1)	-0.9314	0.394	0.0023***	-1.2691	0.281	0.0007***
CONC				-0.0384	0.962	<0.0001***
FEW SUPPLIERS (=1)				-0.8905	0.410	0.0224**
Wald (P value)	0.0022			<0.0001		
Percent Concordant	65.2			76.3		

One tailed test for the following variables: YEARS, UNRELATED, CONC and FEW SUPPLIERS.

\* 0.1.

\*\* 0.05.

\*\*\* 0.01.

opt for a JV when faced with a small number of potential suppliers of complementary local inputs. The effect size is large: if there are less than three suppliers of key complementary inputs, the chances for the U.S.-based MNE to enter the Brazilian market through WOS is reduced significantly by 59% at the 5% confidence level (one tailed test). The sign and significance of these two variable strongly support our first hypothesis that high transaction costs in the market for complementary local inputs lead to JVs with local firms.

We also analyze the impact of the accessibility of complementary assets on the acquisition versus greenfield choice (Table 7). Acquisitions are coded 1, so a positive sign for a coefficient means that an increase in the variable tends to increase the probability that an acquisition will be chosen by US investors to enter Brazil.

Model 1 of Table 7 is our base model. It includes R&D, GROWTH, EXPER and UNRELATED. The only significant coefficient is that of UNRELATED. It shows that if the subsidiary is not producing the same product or service than the parent (UNRELATED = 1), then the probability of entry through acquisition is increased by 35 times. This is conform to previous findings by Larimo (2003). As expected, RD, the parent's R&D intensity, is insignificant. This is consistent with Hennart's model, since whether a parent will exploit its technological innovation through a greenfield or an acquisition depends on whether the technology transferred is modular, i.e. can be superimposed to a target, in which case the choice will be an acquisition, or is systemic, i.e. requires a thorough restructuring of the target, in which case it will be a greenfield. The parent's R&D intensity does not tell us whether the technology is of one type or the other. As predicted, EXPER is also insignificant: contrary to the predictions of Barkema and Vermeulen (1998), general management experience, measured by the number of countries where the US parent has subsidiaries, has no impact on the choice between

greenfield entry and acquisitions. As argued above, the choice between greenfield and acquisition should depends on the modularity of the foreign investor's advantages and on the embeddedness of complementary assets, not on the parent's general international experience, which is equally useful for greenfields and acquisitions.

The coefficient of GROWTH, the growth rate of the Brazilian industry in which the subsidiary operates, is also insignificant. One possible explanation is that Brazil has had fluctuating growth rates over the years, and this may have made investors discount past growth rates as predictors of future ones.

In model 2 we add to the base model CONC and FEW SUPPLIERS, our availability of complementary local inputs variables. This increases the overall explanatory power, as the percentage of correct predictions increases to 86.9% from 83.5% for model 1. RD, GROWTH, EXPER and UNRELATED keep their signs and significance. The coefficient of UNRELATED remains positive and is highly significant. FEW SUPPLIERS, the number of potential suppliers of complementary local inputs, is significant at the 10% confidence level, suggesting that when the number of potential suppliers is small, the foreign investor will tend to enter through acquisitions. The coefficient of concentration ratio CONC is negative and significant at the 1% confidence level, suggesting that US foreign investors are less likely to enter with acquisitions in concentrated industries. Each 1% increase in CONC reduces the chances of entry through acquisition by 2.9%. Recall that acquisitions will be chosen, ceteris paribus, when the market for firms is more efficient than the market for assets or the services of assets. The negative coefficient of CONC suggests that acquisitions are relatively harder to do in concentrated industries due to the small number of potential targets and their large size.

**Table 7**

Parameter estimates for binomial logistic regression model: Acquisition (=1) versus. greenfield (=0).

Variables	Coefficient (T-statistic)			Coefficient (T-statistic)		
	Model 3 (Base Model)	e(Coeff.)	P value	Model 4 (Compl. Local Assets)	e(Coeff.)	P value
Intercept	-1.4789	0.228	<0.0001***	-0.8387	0.432	0.0242**
RD	-0.0076	0.992	0.8767	-0.0211	0.979	0.6685
GROWTH	0.0085	1.009	0.3835	0.0141	1.014	0.3279
EXPER	-0.0021	0.998	0.2272	-0.00216	0.998	0.2269
UNRELATED (=1)	3.6064	36.834	<0.0001***	3.4013	30.004	<0.0001***
CONC				-0.0294	0.971	0.005***
FEW SUPPLIERS (=1)				0.7845	2.191	0.0825*
Wald (P value)	<0.0001			<0.0001		
Percent concordant	83.5			86.9		

One tailed test for the following variables: YEARS, UNRELATED, CONC and FEW SUPPLIERS.

\* 0.1.

\*\* 0.05.

\*\*\* 0.01.

#### 4. Conclusions

In this paper we test Hennart's (2009) contention that a foreign investor's choice between a WOS and a JV, and between a greenfield and an acquisition, depends on the costs involved in accessing the local inputs it needs to successfully manufacture and sell in the target market. These local complementary inputs, such as land, labor, raw materials, parts, permits, and distribution, are often difficult to access because markets for them are often imperfect as they are monopolized by local firms. One implication is that the least efficient the markets for complementary local inputs, the more likely that a foreign investor will enter through a JV with a local firm.

Hennart's model also throws light on the choice between greenfield and acquisition entry. It predicts that greenfield entry will be chosen whenever it is more efficient to obtain complementary local inputs on markets for these inputs, or on those for the inputs that are needed to produce them, than on the market for firms in which these assets are embedded. On the other hand, if markets for firms in which the inputs are embedded are more efficient, foreign investors will enter through acquisitions.

We test these hypotheses on a sample of US entries into Brazil. Emerging countries like Brazil are characterized by wide variations in the efficiency of markets for complementary inputs, so Brazil provides a good context. To the best of our knowledge, ours is the first attempt at operationalizing and testing Hennart's model, and the first large sample study of entry modes into Brazil.

We find support for the hypothesis that US investors joint venture with local Brazilian firms when their subsidiaries are facing few suppliers of local complementary inputs and when they are entering a concentrated industry. US foreign investors also prefer greenfields over acquisitions when entering concentrated Brazilian industries where acquisitions may be difficult.

This paper is obviously a first pass at a complex topic. We operationalized the concept of imperfect market for complementary local inputs by estimating the number of potential suppliers of key inputs to the foreign subsidiary. This approach, which may not fully capture the concept of 'inefficient markets', is made necessary by our large sample. A more micro approach based on in-depth case studies or perhaps focusing on one or two sectors of a host country might make it possible to develop finer-grained operationalizations of this concept that would nicely complement our approach.

While all emerging markets share some common characteristics, such as underperforming or missing formal institutions, they also exhibit differences. While we have no reason to believe that our results cannot be generalized to other emerging markets, or indeed to other developed countries, we encourage scholars to attempt to replicate our findings in other contexts.

In spite of these limitations, our paper contributes to the literature on market entry strategies by giving local firms a role in the choice of modes of entry. Up to now, these firms had been ignored, while the foreign investor was given center stage. Taking explicitly account of local actors changes some of the predictions about entry modes. For instance, while in an investor-centric approach the R&D intensity of foreign investors predicts that they will enter through WOS, this is no longer the case when we take local suppliers of complementary inputs into account. Our results confirm this intuition, and show why this variable has been less than robust in previous studies.

The extant literature has argued that foreign entrants are at a disadvantage due to their general ignorance of local conditions, what has been called the liability of foreignness. Empirical studies in that vein have tended to focus on macro-level variables that present barriers to the entry of foreign investors, such as political risk or the level of corruption. The present study takes a more

micro approach. It considers the difficulty of accessing complementary inputs as one major barrier to the entry of foreign investors, and sees JVs as one way to partially overcome them. Difficulties in accessing complementary inputs are very much sector-specific. Measuring their level is complex and requires detailed investigation. This is an exciting but challenging agenda for future research on entry modes, and particularly for entry modes in emerging markets.

#### Appendix: Elaboration of the FEW SUPPLIERS variable

FEW SUPPLIERS was coded zero (no problems in accessing complementary local inputs) when subsidiaries were dependent on many inputs, none of them key. We also coded FEW SUPPLIERS as zero if there are many ways to distribute the subsidiary's output in the Brazilian market.

We coded FEW SUPPLIERS one (i.e. the subsidiary has three suppliers or less) in the following cases:

1. The product of the foreign subsidiary needs national distribution and there are less than three distributors in Brazil for that product.

This is the case for cheese, where Sadia SA is the main distributor. Another example is the oil service industry, where Brasil Supply SA has a dominant position.

2. The product of the foreign subsidiary needs regional distribution and there are less than three distributors in the region.

For example, the production and distribution of corn seed in the lower Cerrado Savanna region of Brazil was dominated in 2007 by Agromen Sementes Agricola Ltda.

3. The product has to be exported and the facilities that are needed for exporting are owned by less than three companies.

For example, the main Brazilian producers of soybeans and soybean products export through the port of Paranaguá, and the facilities in the port are owned by less than three companies.

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