Abstract of "Essays on Multinational Enterprises" by Yukiko Ito, Ph.D., Brown University, May 2008.

In developed economies, firms have rapidly expanded production opportunities in other countries. However, the difficulties in achieving efficient management in foreign countries have also been long-standing concerns. In this paper, we try to investigate the managerial intentions behind the organizational choices. Under what conditions will MNEs (multinational enterprises) maintain dominant control of affiliates, or what will they do if such conditions are not satisfied? Will they choose to share the management of foreign affiliates, or will they contract out their activities to local firms? Specifically, we discuss what determines co-ownership and how different degrees of ownership are utilized when setting up new firms. Outsourcing is taken into account as the important alternative to the activities by affiliates of MNEs. Our focus is on the decision when MNEs in developed countries set out to less developed countries, seeking export platforms. The setup is based on some actual contracts for equity joint ventures used between local firms and foreign firms, to clarify the role of ownership. We then propose a model and highlight two factors. One is the degree to which a local firm can satisfy the qualifications requested by an MNE. The other factor is the degree to which an MNE needs location-specific knowledge for management. We discuss how these benefits and losses are affecting an MNE's choices of investments, efforts, percentage of ownership, or transaction price for outsourcing. In our empirical analysis, we approach these questions using the data of Japanese-owned foreign affiliates located in Asia, and the data of multinational firms. We find that an MNE with prior experience in the host country has a significant likelihood to choose its foreign direct investment with fully foreign-owned operations. When an MNE chooses a joint ownership, we also find that an existing procurement network by incumbent firms in a local industry is an effective factor. It is found that a greater ownership share is allocated to a local investor, than in the case without such networks. In addition, these economic factors are found to be more influential than some political factors we investigate in this paper.

Essays on Multinational Enterprises

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Contents

List of Tables

List of Figures

Chapter 1

Introductory Remarks on Overseas Activities by Japanese Firms

This chapter gives some introductory remarks and background information about the following chapters. We first give a short summary of our questions and findings. Next we explain the major database we use in our empirical analysis.[1] We then add information about activities by Japanese-owned foreign affiliates. We summarize their regional and industrial patterns, and the transition of these patterns in the past decades. We also briefly comment on offshore outsourcing activity by Japanese firms. Lastly we give an overview about the business networks in the East and South-East Asian economies, where Japanese firms are involved.

1.1 Organizational Forms for Overseas Activities

1.1.1 Issues Discussed in This Paper

Firms in developed economies have rapidly expanded production opportunities in other countries. However, at the same time, the difficulties in achieving efficient management in foreign countries have also been long-standing concerns.[2] In recent years, along with the rapid change in global markets, we observe an increase in the channels of overseas activities for firms. In other words, choices for organizational structures in overseas activities have expanded. In addition, we benefit from large-scale databases to discuss these choices. In this

[1] The remarks on the database in this chapter supplement the introduction of data sets stated in Chapter 3.

[2] Issues are raised by Choi and Beamish (2004) and Pan (1996), for example.

paper, we try to investigate the managerial intentions behind the organizational decisions.

We classify foreign investors' choices into three major categories: (1) fully integrating their affiliates, (2) partially integrating their affiliates, and (3) outsourcing to independent local firms, or various contractual dealings with them. In statistics, the former two are classified as foreign direct investment (FDI) by multinational enterprises (MNEs), and outsourcing is considered a non-FDI activity taken by investors at home.[3]

We view these three organizational forms as distinctively different choices for investors. As a finding to add to the literature, we focus on the difference between fully integrated foreign affiliates and partially integrated ones that are jointly owned by foreign firms and local firms.[4] Specifically, we discuss what determines co-ownership and how different degrees of ownership are utilized when setting up new firms. In our model analysis, non-FDI activities like outsourcing are taken into account as the important alternative to the activities by affiliates of MNEs.[5]

Our focus is on the decision when MNEs in developed countries seek export platforms in less developed countries.[6] The setup is based on some actual contracts for equity joint ventures used between Chinese local firms and foreign firms, to clarify the role of ownership, in terms of allocating profits and losses or managerial control rights.

We then propose a model and highlight two factors. One is the expected ability of a local agent. The ability refers to the degree to which a local firm can satisfy the qualifications (function, design, durability, or delivery) in processing activity requested by an MNE. The specific needs by an MNE constitutes the other factor. These refer to the degree to which an MNE needs location-specific knowledge for management, such as hiring local workers or doing procedural work for local governments.

If an MNE works with a local agent, it may suffer from the incompatible level of processing technology of an agent. An MNE, however, may benefit from a local firm when it acquires location-specific knowledge. We discuss how these benefits (such as access to local

[3]Multinational enterprise is a firm which owns a significant equity share of another company operating in a foreign country. Generally, it has headquarters and other activities in one (home) country and production, marketing, and service activities in this and other (host) countries. In this paper, headquarters based in the home country are defined as parent firms. Organizations in the host countries are defined as foreign affiliates.

[4]Issues studied in the past literature are the dichotomous alternative between wholly owned affiliates and external arm's-length contracts, based on the ex-ante difference in the productivity of MNEs. See Antras (2003), Grossman and Helpman (2003) for example.

[5]In our empirical analysis, we can take an outsourcing activity into account only implicitly. This is because our data sets do not trace outsourcing in a comparable way with other activities we discuss.

[6]Export platforms refer to the use of a country or region as a place to produce for export to another country. They are used especially when a preferential access to the destination country is provided.

knowledge using local firms) and losses (such as an expected deficiency of local firms) are affecting an MNE's choices of investments, efforts, percentage of ownership, or transaction price for outsourcing. We then compare how these choices make a difference in the expected utilities of a MNE.

In our empirical analysis, we approach these questions using the data of Japanese-owned foreign affiliates located in Asia, and the data of multinational firms. Previous studies have discussed some country-level factors that make a difference in ownership structure. However, the findings for disaggregated-level factors are scarce.

With a focus on industry-level and firm-level factors, we present evidence from recent FDI projects, and discern the extent to which ownership structure of new entrants is determined by economic factors between investors and local participants. The economic factors we discuss include the expected technological ability of a local industry, a foreign investor's familiarity with location-specific knowledge, capital intensity in production activity, and the market power of a product sold in the final goods market. Other factors we discuss include the existence of political treatments of tax, permissions, limit of ownership, and local content requirement for each host country by year.[7]

We find that an MNE with prior experience in the host country has a significant likelihood to choose its FDI with fully foreign-owned operations. When an MNE chooses a joint ownership, we also find that an existing procurement network in a local industry by incumbent firms is an effective factor. It is found that a greater ownership share is allocated to a local investor, than in the case without such networks. In addition, these economic factors are found to be more influential than some political factors we investigate in this paper.

1.1.2 Summary of the Model Inference

We would like to summarize here the inference from our model that compares these three organizational forms: full-integration, joint ownership, and outsourcing. To start, in Table 1.1, we show the list of parameters used in the model.

Exogenous or fixed variables are $\bar{\theta}$ (the observable expected value of local ability), λ (the required level of local knowledge to learn), β (the capital intensity of an industry), and α (the degree of product substitutability). Here, $\bar{\theta}$ and β are the variables specific to a host industry into which an MNE considers entering.[8] In contrast, α is the variable specific to

[7] A local content requirement is a rule that goods sold in a country contain a certain minimum of domestic value added.

Symbol	Description	Range
ϕ	equity share of a MNE	$\phi \in (0,1)$
$\bar{\theta}$	expected local absorptive capacity	$\bar{\theta} \in (0,1)$
λ	required local knowledge	$\lambda \in (0,1)$
e_p, e_a	effort for processing and maintenance	$e \in (0,1)$
β	capital intensity	$\beta \in (0,1)$
α	product substitutability; $\frac{1}{\alpha}$ =market power	$\alpha \in (0,1)$

Table 1.1: List of Parameters from the Model

the home industry where an MNE sells its final product.[9] We denote λ as the firm-specific variable to show a firm's requirement to learn local knowledge, defined by an investor's past overseas activities.

Endogenous or choice variables are ϕ (ownership allocation to a principal, or an MNE), e_p (effort by a principal), and e_a (effort by an agent, or a local producer). Then ϕ shows the ownership of a foreign affiliate defined by an MNE. This is set specifically at the time of the contract, to maximize an MNE's expected utility. In addition, e_p and e_a are both counted as the time spent out of the total time of 1. An MNE makes an effort when it chooses full-integration or joint ownership of the organization, and a local partner makes an effort when it participates in an outsourcing contract or in joint ownership. Both efforts are taken at the time of production (i.e. after the contracts, or matching).

Our inference over the determinants and their effects are summarized in Table 1.2. We first investigate the relationships between ϕ_i (the optimal ownership for firm i) and $\bar{\theta}$ (an expected local capacity) as well as between ϕ_i and λ_i (a location-specific knowledge required for firm i), and ϕ_i and α (a markup in the final goods market for a firm). These are listed on the middle column of Table 1.2.

Question	Ownership Allocation (ϕ)	Likelihood for Joint
[parameters]	[inference]	[inference]
expected local capacity ($\bar{\theta}$)	Positive effect	Positive effect
required local knowledge (λ)	Negative effect	Positive effect
capital intensity (β)	n.a.	Not monotonic
markup ($\frac{1}{\alpha}$)	Positive effect	Not monotonic

Table 1.2: Inference from the Model

[8] We compute local firms' absorptive capacity by two-digit industry level, and capital intensity of production by three-digit industry level, respectively.

[9] We compute the $markup = 1/\alpha$ by three-digit industry level.

First, the optimal ownership percentage for an MNE is an increasing function with respect to a local industry's absorptive capacity. When a higher production technology is expected to be available, the production process becomes less dependent on the effort of an agent, and we observe a lower e_a. An MNE then tries to compensate for the loss of yield (from a smaller e_a) by holding a higher ownership, so that the yield can be controlled more by the MNE.[10]

Second, the optimal ownership for an MNE is a decreasing function with respect to a required location-specific knowledge. When the required knowledge becomes more complex, the principal tries to delegate its ownership to a local agent to acquire more local knowledge. An MNE then mitigates the loss to its yield. This comes from the assumption that local know-how is provided through a local counterpart, in proportion to a local agent's share in ownership.[11]

Third, a lower α (substitutability of products) or a higher markup $(1/\alpha)$ means a higher profitability for a firm in a final goods market. An MNE then has an incentive to choose a higher ownership allocation to have a greater marginal benefit from sales.

Next, we discuss the likelihood that joint ownership is chosen for each parameter. These are listed on the right column of Table 1.2. We analyze how each parameter affects the choice of joint ownership compared to integration and to outsourcing. We therefore compare the expected utilities of three organizational forms. In our model, the expected utility of an investor increases if either a higher payoff or more time (less effort) is predicted.

As the expected local capacity increases, the expected utility of joint ownership comes to exceed the constant utility level of full integration. The utility of joint ownership is also higher than that of outsourcing, where the value of expected capacity is high enough. As the required knowledge increases, the expected loss of utility in joint ownership becomes relatively smaller than that of full integration. We then have a positive effect for the likelihood of joint ownership, as we state in Table 1.2.[12]

With changes in β or α, utilities of all three organizations change, so that the exact change in the likelihood for joint ownership is not monotonic.

The marginal effects of two parameters: $\bar{\theta}$ and λ, and comparison between organizational

[10] The yield, or expected yield, refers to the percentage of products successfully produced out of the feasible production volume. The yield depends on both technological performance and managerial knowledge.

[11] For example, the number of people on the board of directors is allocated in proportion to the ownership held by investing firms. Then directors from local firms are expected to provide the location-specific knowledge.

[12] However, we actually have an ambiguity whether the expected utility of joint ownership is actually higher than that of outsourcing, as it depends on the other parameter values such as $\bar{\theta}$.

forms are shown in Table 1.3, although the description is for the case of a specific choice of parameters.[13] It is good to keep in mind that the expected local capacity ($\bar{\theta}$) does not matter for integration, as an MNE fully controls its affiliates. Similarly, the required local knowledge (λ) does not affect the utility of outsourcing, as a local firm fully controls the manufacturing process.

With a marginal increase in local capacity, utility of a joint ownership is relatively enhanced compared to outsourcing. In joint ownership, firms gain the combined benefits of increasing their yield and reducing their efforts. With a marginal increase in required local knowledge, loss of utility for a joint ownership is relatively mitigated compared to full-integration. In joint ownership, firms may avoid loss of both payoff and time, by introducing local knowledge with a delegation of ownership to a local party.

Organization	Marginal utility by $\Delta\bar{\theta}$	Marginal utility by $\Delta\lambda$
Integration	n.a.	marginal loss to utility
Joint Ownership	enhanced marginal gain to utility	mitigated marginal loss to utility
Outsourcing	marginal gain to utility	n.a.

Table 1.3: Marginal Effects on the Utility of an MNE

1.1.3 Summary of the Empirical finding

What we specify as a situation to clarify owners' intentions for ownership decision is green-field FDI (i.e. setting up a new firm at a foreign location from scratch) by northern firms into southern economies. Along with this setting, we investigate a panel data of Japanese multinational or domestic firms and a connectable panel data of their foreign affiliate located in Asia.

Unlike the matching between two domestic firms, our setting is safe from several cumbersome issues in ownership decision. First, as firms are built from scratch, percentage of ownership is not affected by any previous records of ownership. Second, as firms are not publicly traded by investors in stock markets, percentage of ownership is not affected by

[13] $\bar{\theta} = 0.6$ with a marginal change, $\lambda = 0.3$ with a marginal change, $r_p = 0.04$, $r_a = 0.05$, $w = 5$, $\beta = 1/3$, $\alpha = 0.9$, $A = 10^7$ and $\delta = 10$. A is a constant positive term indicating the demand for an industry as a whole. δ is a non-negative constant value that an agent obtains. r is the borrowing interest rate. $w = 5$ shows the local unit wage. The unit cost of production $c = r^{\beta} w^{1-\beta}$ in an MNE is 1. Please see Chapter 2 for details.

third parties. Third, as foreign affiliates are not included in the consolidated tax report of MNEs in Japan, MNEs do not need to manipulate their ownership of foreign affiliates for tax-cutting.

We apply probit estimation for choices between joint-ownership and full integration. We also take into account some factors that promote outsourcing. Next we estimate the determinants for ownership percentage combining the first stage probit regression and modified truncated regression model (i.e. MLE left-censored at 10% and right-truncated at 100%) for jointly-owned foreign affiliates.[14] This methodology is based on Lin and Schmidt (1984) and explained in Chapter 3. In this chapter, we briefly introduce the empirical results and their correspondence with our model inference. Detailed descriptions of empirical results are given in Chapter 3.

First we find that a higher requirement for local knowledge is a promoting factor for joint-ownership, and a discouraging factor for full-integration. We measure the level of acquired local knowledge by MNEs' prior experience of operation at the time they set up a new foreign affiliate.[15] We also find that, in joint ownership, MNEs without preceding FDI experience at the same host country hold a lower percentage of ownership compared to the firms with the experience.

Second, we show that a higher markup in final goods markets may promote an MNE to hold a higher percentage of ownership. We here measure the markup for each 3-digit level industry using the domestic firm-level data of Japan.

So far, the results are corresponding to our specification. However, the expected local absorptive capacity shows weak significance for the likelihood of joint ownership. Moreover, the expected capability is not a factor for higher percentage of ownership for MNEs, and even a negative factor for firms doing export processing. As our proxy for local industries' capability, we use the local procurement ratio by incumbent foreign affiliates (before the setup of a new firm), controlled by industry dummies. However, given these results, we may need to try other variables as well as other theoretical setups to cross-check. These remain to be the subject of our future research.

[14] 10% is the observable lower bound for foreign ownership. When an investor holds a 10% or more of foreign ownership, it is classified as a foreign direct investment, according to the statistical definition.

[15] The prior experience in the same host country has a significant results, although the experience at other Asian economies does not show any significant results.

1.2 Data

Here we introduce two of the base data sets we use: the *Basic Survey of Japanese Business Structure and Activities*, and the *Basic Survey of Overseas Business Activities*. These are national surveys, and firm-level information is accessible for us by a permission of the Japanese government. (We have a confidential agreement with the bureau of statistics in Japan.) We use the information of parent firms from the former database, and we use the information of foreign affiliates from the latter database

1.2.1 *Basic Survey of Japanese Business Structure and Activities*

This survey has been conducted annually from 1992 to acquire a collective and quantitative understanding of the actual conditions of diversification, and internationalization of Japanese enterprises, both domestic and multinational ones.

The scope of this survey covers enterprises located in Japan with 50 or more employees and whose paid-up capital or investment fund is over 30 million yen. Industries covered are mining, manufacturing, and wholesale and retail trade, as well as other service activities. In other words, it covers almost all the major industries, except for agriculture, finance and insurance, and public sectors. The reporting to this survey is compulsory for all firms. (When reporting is compulsory, an enterprise who does not report or misreports can be fined.) The number of enterprises that submitted a response in 2007 was 30,572 firms and the response rate based on the number of target enterprises is 81.2%.

The statistics file the following information of the target enterprises located in Japan: ownership structure, industry or composition of industries, composition of sales and purchase(by location, and by industry), volume of international trade (by region, including the share of intra-firm trade if any), R&D and IT investments (by flow), and transaction of intellectual property rights (patents, royalties, and licenses) domestically and internationally. We compute 3-digit level aggregate industrial statistics from this database. Specifically, the industry-level capital intensity, and industry-level markup are used in our empirical analysis in Chapter 3.

To view how much these enterprises extended their activity abroad, Table 1.4 summarizes the ownership of affiliates both at home country and foreign countries. Among the surveyed enterprises, about one half of manufacturing and wholesaling firms, and about one-third of retailing firm has at least one affiliate. As a whole, 44% of the reporting enterprises have affiliates in 2005. The majority of those, 88.4% of firms, have domestic affiliates. The percentage of firms with domestic affiliates is highest in the retailing sector (97.5%),

Database of Japanese Firms (located in Japan) in 2002 and 2005		Number of Enterprises	Number of enterprises that own affiliates (Parent Firms)				
				Number of parent firms that own domestic affiliates		Number of parent firms that own overseas affiliates	
Total	(Year)				(composition ratio: %)		(composition ratio: %)
	2002	26,169	11,540	10,525	91.2%	3,956	34.3%
	2005	26,093	11,474	10,142	88.4%	4,463	38.9%
Manufacturing							
	2002	12,946	5,812	5,076	87.3%	2,673	46.0%
	2005	12,986	5,918	4,975	84.1%	3,084	52.1%
Wholesaling							
	2002	6,022	3,083	2,888	93.7%	864	28.0%
	2005	5,746	2,908	2,650	91.1%	922	31.7%
Retailing							
	2002	3,491	1,284	1,260	98.1%	128	10.0%
	2005	3,535	1,264	1,233	97.5%	134	10.6%

: Data source is the "Basic Survey of Japanese Business Structure and Activities"

: As some enterprises have both domestic affiliates and overseas affiliates, the total does not match the sum of respective values.

: "The number of parent firms that own foreign affiliates" referred here does not match the number of firms by the "Basic Survey of Overseas Activities." We explain about the correspondence between two statistics in the text and show the difference in Table 1.8

: Composition ratio is defined as follows:

=number of enterprises with overseas (or domestic) affiliates/number of enterprises that own affiliates

: For the total number of enterprises, we include industries of manufacturing, wholesaling, retailing, information services, and other services.

Table 1.4: Ownership of Affiliates in Major Sectors of Industries

and the lowest in manufacturing sector (84.1%) in 2005. The ownership of foreign affiliates varies by sector; about 50% of manufacturing firms have foreign affiliates, and the proportion is about 30% in wholesaling and 10% in retailing. Tradable goods and services, or foreign business opportunity is most available for manufacturing sector, but the availability appears to be limited in the retailing sector.[16]

From the respondents, we extract the enterprises that own overseas affiliates so that the statistics provide the detailed information of Japanese multinational enterprises. Then we use this database with the statistics of the Japanese-owned foreign affiliates, which we will introduce in the next subsection.

1.2.2 *Basic Survey of Overseas Business Activities*

This survey, conducted annually since 1980, presents the actual conditions affecting overseas business activities of Japanese corporations. One is the Basic survey which is more detailed and carried out every three years. The other is the Trend survey which is comparatively rough and carried out between the Basic surveys.

Survey targets are parent companies and their overseas affiliates. In the fiscal year of 2006, 3,176 parent companies and 15,812 overseas affiliates, which comprises 69.6% of the target group, gave a valid response to this survey. The reporting is compulsory for firms which own foreign affiliates as the affiliates' primary shareholders. In contrast, the reporting is optional for firms which own foreign subsidiaries as the secondary or minor shareholders. (When reporting is optional, an enterprise will not be fined even if it does not respond to the survey.)

Parent companies are Japanese corporations which own or have owned overseas affiliates in the past, excluding those in the financial and insurance industry or real estate industry. For parent companies, the statistics collect the information about their primary industry, sales volume, the number of employees, and the number and location of foreign affiliates. This survey also contains a questionnaire for overseas expansion strategies.

Since the information for parent companies listed above is less abundant than those of the *Basic Survey of Japanese Business Structure and Activities*, we connect the parent firms in both statistics to obtain more detailed information. However, we need to keep in mind that the two sets of data do not have a one-to-one correspondence of the parent firms due

[16]The pattern of ownership of affiliates has also changed, and affiliates are more likely to be fully-owned by the parent companies. The proportion of fully owned affiliates out of the total number of domestic and overseas affiliates was 42.5% in 1995, and 54.6% in 2005.Instead, the proportion of affiliates with ownership between 20% to 50% decreased; from 34.3% in 1995 to 22.2% in 2005.

to the difference in coverage and in reporting procedures between the two.

In Table 1.5, we show the number of parent firms with overseas affiliates, by two different statistics, and what our data sets in Chapter 3 include.

The first column shows the number of parent firms counted in the *Basic Survey of Japanese Business Structure and Activities*. The second column shows the number in the *Basic Survey of Overseas Business Activities*. The large gap in the numbers is due to the different scope of parent firms. For example, when any two Japanese firms, 1 and 2, both own the same foreign affiliate jointly with 10% or more of ownership for each, both firms are counted as the parent firms in the former statistics. In contrast, only one parent firm with a higher share of ownership is counted as the parent firm in the latter statistics.

We construct two data sets for parent firms, which also specify the number and scope of affiliates. One of these (hereinafter we call it Data A) is based only on *Basic Survey of Overseas Business Activities*, and is shown in the second column of Table 1.5. in Data A, there is relatively limited information for each parent firm, but we have a larger number of parent firms and affiliates compared to the other.

The other set (hereinafter we call it Data B) is based on the matched records of parent firms from the *Basic Survey of Japanese Business Structure and Activities* and the *Basic Survey of Overseas Business Activities*, and is shown in the third column of Table 1.5. In this set, there are relatively smaller numbers of parent firms, but we have more abundant information for each parent company. More importantly, we could also obtain the industry-level variables such as capital intensity and markup using the *Basic Survey of Japanese Business Structure and Activities*.

In this survey, an overseas affiliate refers to a overseas company in which a Japanese company or companies make a 10% or greater investment. We also include overseas sub-affiliates.[17]

For the survey of overseas affiliates, the statistics contain the following information: ownership status (or composition of shareholders), primary industry, employment, breakdown of sales (selling locally or globally by export, with destinations), breakdown of purchase (buying locally or globally by import, with source countries), operating expenses, profits (including retained earnings), and R&D expenses.

The information of parent and their foreign affiliates are connectable by the common

[17] A sub-affiliate refers to the following two types of firms: a foreign affiliate in which a "affiliate," funded more than 50% by a Japanese corporation, has invested capital of more than 50%, and a foreign affiliate in which a Japanese corporation and a affiliate funded more than 50% by a Japanese corporation have invested capital of more than 50%.

	The Number of Parent Firms with Overseas Affiliates		
	From *the Basic Survey of Japanese Business Structure and Activities* ***(1)***	From *the Basic Survey of Overseas Business Activities* *(2):* **Data A**	The Matching of (1) and (2) **Data B**
Year		**Data A in Chapter 3**	**Data B in Chapter 3**
1994	3,268	1,832	1,607
1995	3,468	2,088	1,685
1996	3,505	2,170	1,791
1997	3,560	2,049	1,791
1998	3,584	2,088	1,822
1999	3,773	1,992	1,852
2000	3,937	1,943	1,879
2001	4,049	2,202	1,904
2002	3,956	2,464	1,861
Remarks on the selection of parent firms	: Firms that own overseas affiliates with a 10% or more of ownership. : If 2 (or more) Japanese firms own one foreign affiliate jointly, the parent firm of such affiliate is counted twice (or more). : Reporting is compulsory. : Firms have 50 or more employees. : Firms have a paid-up capital of 30 million yen or more.	: Firms that own overseas affiliates with a 10% or more of ownership., and own those as the primary shareholders. :Even if 2 (or more) Japanese firms own one foreign affiliate, the parent firm of such affiliate is counted once. :Each affiliate is corresponding to its primary parent firm. : Reporting is compulsory.	: Firms that own overseas affiliates with a 10% or more of ownership, and own those as the primary shareholders. :Even if 2 (or more) Japanese firms own one foreign affiliate, the parent firm of such affiliate is counted once. :Each affiliate is corresponding to its primary parent firm. : Reporting is compulsory. : Firms have 50 or more employees : Firms have a paid-up capital of 30 million yen or more.

Table 1.5: The Number of Parent Firms in Our Analysis in Chapter 3

firm-level code. We then figure out the relation between a parent and its affiliate, or between affiliates.

		Exports to Overseas Affiliates		
		1995	2000	2005
Value of Exports		7,016	14,216	21,979
	North America	2,623	5,445	6,949
	Asia	2,800	5,223	8,736
	Europe	1,303	2,765	4,997
	Others	289	784	1,297
Percentage in the Total value of exports		17.1%	28.5%	33.7%
		Imports from Overseas Affiliates		
		1995	2000	2005
Value of Imports		3,424	6,113	9,307
	North America	517	681	767
	Asia	2,271	4,924	6,630
	Europe	118	287	351
	Others	519	222	437
Percentage in the Total value of imports		11.6%	16.0%	18.5%

: The data of total amount of exports and imports from and to Japan are taken from "Balance of Payments Statistics" (Bank of Japan)

: The values of export and import are shown in billion yen of real 2000 price.

Table 1.6: Intra-firm Trade: Exports to Overseas Affiliates, and Imports from Overseas Affiliates

Table 1.6 shows the volume of intra-firm trade between parent firms and overseas affiliates. In 2005, 33.7% of the total exports from Japan are intra-firm exports, in which parent firms export materials and products to their affiliates. Compared to the data of 1995, the volume of intra-firm trade has been tripled and the proportion of this type of transaction has been nearly doubled.[18] Intra-firm trade has expanded in every region, and in 2005, the Asian affiliates became the largest partners of intra-firm trade.

The intra-firm imports, in which parent firms import materials and products from Japanese-owned foreign affiliates, are also increasing in volume and in share. In 2005, the volume (9.3 trillion yen) and the share (18.5%), however, are smaller than those of intra-firm exports (22 trillion yen, and 33.7%, respectively). The regional pattern of intra-firm imports is more concentrated in Asia than that in exports. Although the intra-firm

[18] the value of exports and imports are calculated in the real price of year 2000.

imports are increasing in all regions, more than two-thirds of intra-firm imports come from the affiliates in Asian economies throughout the observed period.

This characteristic shows that the unique role of Asian affiliates which is not obviously observed for firms in other regions is the role as the export platforms, the production plants for parent firms to reverse-import the final products sold in the Japanese market.

1.3 Activities by Japanese-owned Foreign Affiliates

1.3.1 Entry and Exit

In 2005, the value of overseas production by Japanese-owned foreign affiliates is 16.7% of the total sales achieved by all Japanese companies. The value has a share of 30.6%, compared to the sales by multinational companies (i.e. companies with overseas affiliates).[19] These records in 2005 are the highest ever. In a decade ago, the proportions were about two-thirds of the current figures. In 1995, for example, the figure was 10.4% based on all domestic companies, and 21.8% based on companies with foreign affiliates. This trend shows that overseas activities have gained importance as a channel for Japanese products and services, either for local sales or export.

At the same time, there are a high number of firms which enter into or exit from foreign countries. Using firm-level statistics, we would like to give an overview of overseas activity by affiliates. We use the *Basic Survey of Overseas Business Activities* and the database of foreign affiliates of Japanese firms provided by Toyo-Keizai Inc., a private company. The latter statistics cover missing or insufficient reports of the former, although the information available for each affiliate in the statistics is less abundant than the former.[20]

Table 1.7 describes the total number of existing foreign affiliates, the number of newly established or acquired affiliates, and the number of affiliates shut down during each reporting year.[21] The number of foreign affiliates increased until 1997, but it has been decreasing since 1998. In 2002, there were 16,437 firms in total. During the year, 425 affiliates (i.e. 2.7% of the number of affiliates in 2001) were established, but 1,555 affiliates (i.e. 9.9% of the number of affiliates in 2001) were closed.

[19] Source: *Basic Survey of Overseas Business Activities*. The statistics mentioned in this section are based on this survey, unless otherwise cited.

[20] The information of an affiliate available in Toyo-Keizai database is as follows: name and location of the firm, name of its parent firm, number of employees, industry, year of establishment, year of exit (if any).

[21] Throughout the paper, we use the term "affiliate" to refer to a business enterprise, not an establishment. Enterprises may operate any number of establishments, but we do not track the information of each establishment.

Year	Number of Parent Firms that own Foreign Affiliates	growth rate: t-(t-1)	Number of Foreign Affiliates	growth rate: t-(t-1)	Number of Entered Foreign Affiliates	growth rate: t-(t-1)※	Number of Exited Foreign Affiliates	growth rate: t-(t-1)※
1989	1,354		12,648					
1990	1,610	18.9%	14,252	12.7%	1,769	14.0%	165	1.3%
1991	1,644	2.1%	14,989	5.2%	1,240	8.7%	503	3.5%
1992	1,926	17.2%	15,315	2.2%	1,002	6.7%	676	4.5%
1993	2,249	16.8%	15,634	2.1%	1,099	7.2%	780	5.1%
1994	1,832	-18.5%	16,265	4.0%	1,259	8.1%	628	4.0%
1995	2,088	14.0%	17,016	4.6%	1,566	9.6%	815	5.0%
1996	2,170	3.9%	17,665	3.8%	1,314	7.7%	665	3.9%
1997	2,049	-5.6%	18,101	2.5%	1,081	6.1%	645	3.7%
1998	2,088	1.9%	17,804	-1.6%	599	3.3%	896	5.0%
1999	1,992	-4.6%	17,410	-2.2%	531	3.0%	925	5.2%
2000	1,943	-2.5%	17,024	-2.2%	510	2.9%	896	5.1%
2001	2,202	13.3%	15,767	-7.4%	521	3.1%	1,778	10.4%
2002	2,464	11.9%	14,637	-7.2%	425	2.7%	1,555	9.9%

: Statistics are based on the *Basic Survey of Overseas Business Activities (1989-2002)*

: Missing records in the above statistics are supplemented by the database of foreign affiliates provided by Toyo Keizai Inc.

: The method of matching records of the two database is explained by Matsuura and Nagata (2004)

: Foreign affiliates are owned by Japanese firms with a 10% or more percentage of ownership.

: Growth rates for the number of entrants are computed by :
=(Number of entrants during year t) / (Number of existing firms at the end of year t-1)

: Growth rates for the number of exiters are computed by :
=(Number of exiters during year t) / (Number of existing firms at the end of year t-1)

Table 1.7: Entry and Exit for Overseas Activities by Year

According to the questionnaire along with this survey, some of the reasons of the decline are temporary shocks such as the financial crisis in Asian economies and the economic recession in Japan. However, the major reason for the decline, which 33% of the surveyed parent firms in 2002 pointed out, is the long-run trend of globalization or trade liberalization, and the reallocation of investments required as a result. Some multinational enterprises came to integrate their assets and locations to enhance the efficiency of investment. For example, a lower barrier for trade, or an easier access to overseas activities such as outsourcing, may replace the tariff-jumping overseas activity formerly operated by affiliates during the period of trade protection. From Table 1.7 we also figure out that the average number of foreign affiliates per parent firm is decreasing since 1998. We have an increasing number of parent firms and a decreasing number of foreign affiliates.

Location of Foreign Affiliates of Japanese Firms		Asia		EU		North America		Others		World Total	
Existing affiliates in	*1989*	5,042		2,364		3,664		1,578		12,648	
	1992	6,351		3,066		4,089		1,809		15,315	
	1995	8,158		3,063		3,952		1,843		17,016	
	1998	9,029		3,107		3,869		1,799		17,804	
Entry and Exit of Foreign Affiliates		proportion to the total number of affiliates, in %		proportion to the total number of affiliates, in %		proportion to the total number of affiliates, in %		proportion to the total number of affiliates, in %		proportion to the total number of affiliates, in %	
Entrants during	*1989-1992*	1,770	35%	1,008	43%	881	24%	352	22%	4,011	32%
	1992-1995	2,660	42%	459	15%	485	12%	320	18%	3,924	26%
	1995-1998	1,778	22%	426	14%	500	13%	290	16%	2,994	18%
	1998-2002	1,179	13%	317	10%	355	9%	136	8%	1,987	11%
Exited during	*1989-1992*	461	9%	306	13%	456	12%	121	8%	1,344	11%
	1992-1995	853	13%	462	15%	622	15%	286	16%	2,223	15%
	1995-1998	907	11%	382	12%	583	15%	334	18%	2,206	13%
	1998-2002	2,315	26%	903	29%	1,315	34%	621	35%	5,154	29%

: Statistics are based on the *Basic Survey of Overseas Business Activities (1989-2002)*

: % for entrants and existers are computed by:

=(Number of Entry or Exit during "t-1" to "t")/(Number of existing affiliates in year "t-1")

Table 1.8: Entry and Exit of Foreign Affiliates by Region and by Year

Table 1.8 classifies the entry and exit of firms by region. In less than a decade, the number of affiliates in Asia increased from 5,042 (in 1989) to 9,029 (in 1998). Throughout the surveyed years, Asian economies have been the major location of overseas activities for Japanese companies in terms of the number of affiliates. Now, more than a half of the existing affiliates are operating in Asian economies. In 2002, the number is about three times as large as those in the E.U. (European Union) and more than two times greater than those in North America. The peak of the entry in Asia is from 1992 to 1995, which comes after the peak of entry into other regions. However, during 1998 and 2002, the number of affiliates shut down increased across all regions.

Location of Foreign Affiliates in Asia		NIES		ASEAN		China (Mainland China)		Others		Asian Economies Total	
Existing affiliates in	*1989*	2,814		1,814		291		123		5,042	
	1992	3,204		2,382		614		151		6,351	
	1995	3,352		2,799		1,790		217		8,158	
	1998	3,416		3,125		2,122		366		9,029	
Entry and Exit of Foreign Affiliates		proportion to the total number of affiliates in %		proportion to the total number of affiliates in %		proportion to the total number of affiliates in %		proportion to the total number of affiliates in %		proportion to the total number of affiliates in %	
Entrants during	*1989-1992*	685	24%	686	38%	355	122%	44	36%	1,770	35%
	1992-1995	594	19%	660	28%	1,312	214%	94	62%	2,660	42%
	1995-1998	476	14%	600	21%	531	30%	171	79%	1,778	22%
	1998-2002	331	10%	269	9%	510	24%	69	19%	1,179	13%
Existers during	*1989-1992*	295	10%	118	7%	32	11%	16	13%	461	9%
	1992-1995	446	14%	243	10%	136	22%	28	19%	853	13%
	1995-1998	412	12%	274	10%	199	11%	22	10%	907	11%
	1998-2002	959	28%	730	23%	527	25%	99	27%	2,315	26%

: Statistics are based on the *Basic Survey of Overseas Business Activities (1989-2002)*

: NIES refers to Singapore, Taiwan, Hong Kong, and South Korea

: ASEAN refers to South-East Asian countries except for Singapore

: % for entrants and existers are computed by:

=(Number of Entry or Exit during "t-1" to "t")/(Number of existing affiliates in year "t-1")

Table 1.9: Entry and Exit of Foreign Affiliates in Asian Economies by Year

Table 1.9 focuses on the entry and exit of Japanese firms specifically in Asian economies. We here divide the economies into three categories. NIES (Newly Industrialized Economies) refer to the economies of Singapore, Taiwan, Hong Kong, and South Korea. ASEAN (The Association of Southeast Asian Nations) covers South-East Asian countries except for Singapore. China refers to mainland China.

In 1980s, outward investment to China was not active due to severe restrictions on foreign investment. In 1992, the government began to allow multinationals to sell goods to the domestic markets as well as to foreign markets more freely (c.f. Naughton; 2006). Therefore, we observe a surge in the number of entrants during 1992 and 1995 in China. Among the total entrants to Asian economies during 1992 and 1995 (2,660 firms), almost a half of those (1,312 firms) chose China as the location for new establishments or for capital participation. But the pace of entry into China became moderate after 1995 as happened in other Asian regions.

1.3.2 Regional Patterns

Table 1.10 describes the relative size of activities by region in terms of sales and number of employees hired by foreign affiliates of Japanese firms. Sales values include both the amount of local sales and the amount of export from affiliates. We set the total amount of sales or the number of employees by foreign affiliates in each year as 100%, and report

Location of Japanese-owned Affiliates		Share in Sales (%)			Share in the Number of Employees		
		1989	1995	2002	1989	1995	2002
Asian Economies		17.8%	26.5%	28.7%	47.0%	55.0%	62.8%
	NIES	12.9%	16.0%	15.8%	21.3%	13.5%	10.5%
	ASEAN	4.3%	8.9%	8.5%	21.8%	28.8%	29.5%
	China	0.2%	1.1%	3.6%	2.0%	10.7%	19.7%
	Other Asia	0.4%	0.5%	0.8%	1.9%	2.0%	3.1%
North & South America		49.2%	44.2%	46.9%	37.1%	30.4%	23.1%
	U.S.A.	43.2%	38.5%	40.1%	25.9%	23.5%	18.6%
	Canada	2.9%	2.1%	3.0%	1.7%	1.3%	1.0%
	Latin America	3.1%	3.6%	3.8%	9.5%	5.6%	3.5%
Europe		27.8%	24.8%	20.2%	10.9%	11.3%	11.5%
Others	Middle East	0.6%	0.7%	1.0%	0.6%	0.4%	0.3%
	Oceania	4.6%	3.5%	2.8%	3.6%	2.2%	1.4%
	Africa	0.2%	0.3%	0.5%	0.8%	0.6%	0.8%
		100%	100%	100%	100%	100%	100%

: Statistics are based on the *Basic Survey of Overseas Business Activities (1989-2002)*

Table 1.10: Share in the Total Amount of Sales, and Share in the Total Number of Employees, by Region

the contribution of affiliates in each region. In 2002, sales by affiliates in the U.S. comprise 40.1% of the total sales achieved by all the affiliates of Japanese firms in the world. Sales by affiliates in Asia, which are 28.7% in total, come next. The share of Asia has been increasing, and it has been exceeding the share of affiliates in Europe since 1995.

The number of employees are sharply increasing, as well as concentrating in Asian economies. Specifically, the number of employees in China and ASEAN has increased remarkably. However, the number of employees in NIES economies is in decline. According to the questionnaire along with the survey in 2002, some of the reasons for the decline include an increase in the unit cost of labor and a change in the type of plant activity from labor-intensive processing to capital intensive production.

Table 1.11 compares the regional patterns of overseas activity of Japanese-owned affiliates with the data of U.S.-owned foreign affiliates. We show the activities by majority-owned affiliates to be compatible with the data tables presented in Hanson, Mataloni, and Slaughter (2001).[22] We also select regions, and years that are comparable with the U.S. data.

According to the Japanese and U.S. statistics in 1998, the scale of activity by Japanese

[22] An affiliate is a majority owned affiliate if more than 50% of ownership is held by a Japanese parent, and a US parent, respectively. Therefore, the targeted firms for each survey do not overlap.

		Japanese-Owned Foreign Affiliates				U.S.-Owned Foreign Affiliates			
Number of Majority-owned Foreign Affiliates		1989		1998		1989		1998	
World Total		9,259		14,624		15,381		21,335	
	All OECD	5,717	61.7%	7,168	49.0%	10,937	71.1%	14,480	67.9%
	Latin America	618	6.7%	794	5.4%	2,409	15.7%	3,345	15.7%
	Non-OECD Asia	2,784	30.1%	6,382	43.6%	1,282	8.3%	2,449	11.5%
	Africa	67	0.7%	101	0.7%	397	2.6%	511	2.4%
	Middle East	37	0.4%	53	0.4%	187	1.2%	233	1.1%
Amount of Sales (billion US$)		1989		1998		1989		1998	
World Total		679		1,054		1,161		2,028	
	All OECD	565	83.2%	787	74.7%	964	83.0%	1,553	76.6%
	Latin America	19	2.8%	34	3.2%	99	8.5%	231	11.4%
	Non-OECD Asia	91	13.4%	223	21.2%	68	5.9%	201	9.9%
	Africa	1	0.1%	3	0.3%	13	1.1%	21	1.0%
	Middle East	3	0.4%	7	0.7%	9	0.8%	9	0.4%
Number of Employees (1,000)		1989		1998		1989		1998	
World Total		1,314		2,928		5,114		6,900	
	All OECD	708	53.9%	1,231	42.0%	3,582	70.0%	4,433	64.2%
	Latin America	121	9.2%	138	4.7%	962	18.8%	1,416	20.5%
	Non-OECD Asia	474	36.1%	1,533	52.4%	393	7.7%	827	12.0%
	Africa	4	0.3%	15	0.5%	81	1.6%	111	1.6%
	Middle East	4	0.3%	3	0.1%	69	1.3%	50	0.7%

: Source of U.S. Data is "Foreign Direct Investment in the U.S. : Financial and Operating Data for U.S. Affiliates of Foreign Multinational Companies," from Bureau of Economic Analysis.

: Data of U.S. Affiliates are cited from Hanson, Mataloni, and Slaughter (2001).

: Source of Japanese Data is the "Basic Survey of Overseas Business Activities."

: Data of Japanese Affiliates are based on Matsuura and Nagata (2004).

: An affiliate is a majority-owned foreign affiliate if more than 50% of its ownership is owned by parent firms abroad (Japan, or the U.S.).

: Amount of Sales is counted as real price as of 1998. The unit is a billion US dollars.

: Number of employees are shown by the unit of 1000 people.

Table 1.11: Comparison of the Scale of Activity in Number, Sales, and Employment by Foreign Affiliates by Region: Majority-Owned Japanese Affiliates and Majority-Owned U.S. Affiliates

affiliates is about two-thirds that of the U.S. in terms of the number of affiliates, and about one half, in terms of the value of sales (in real price of 1998, billions of U.S. dollars). The expansion of the number of affiliates and the size of employment during 1989 and 1998, however, has been more active for Japan than for the U.S.

When we look at regional patterns, we find the following: First, OECD economies (member countries of the OECD, or developed nations) are the major host countries for the sales of both countries. In 1998, around 75% of sales come from affiliates in OECD, although the share declined from 1989 for both countries. Next, geographical factors have made non-OECD Asia the next largest host economies (with 21.2% of sales) for Japan. Similarly, Latin America comes as the next largest host area for activities for the U.S. (with 11.4% of sales). Lastly, the share of sales to non-OECD Asia has increased for both countries. Specifically, the share of sales in non-OECD Asia has increased by 7.8% for Japan, and 4% for the U.S from 1989 to 1998. The share of the number of affiliates in those countries has increased by 13.5% for Japan, and 3.2% for the U.S.

1.3.3 Industrial Patterns

Table 1.12 compares the industrial patterns of foreign activities by Japan with those of the U.S. in 1998. In Japan, 40.3% of sales come from manufacturing industries, about one-third of which come from electronic machinery. The rest of the sales comes from the service sector. In the U.S., 47% of sales are from manufacturing affiliates, 11.5% from petroleum, and the remaining 41.5% from service. The composition of the service sector is also different between Japanese and the U.S. affiliates. In terms of sales, 49.5% of value comes from wholesale and retail service in Japan, but the proportion is 20.7% in the U.S. In the U.S. affiliates, 7.2% of sales comes from financial services, but the ratio in Japan is just 2.9%.

If we compare the number of firms or the number of employees, overseas activities by Japan are more weighted on manufacturing than those in the U.S.; about 50% of firms, and 81.7% of employees of the former are in the manufacturing industries.

1.3.4 Offshore Outsourcing

Here we give some remarks on the offshore outsourcing conducted by Japanese firms. Offshore outsourcing refers to a movement of production process, or a movement of various back office functions to another country by contracts. It then excludes general purchase of materials not based on specific contracts. The tasks usually follow clients' orders in spec,

Majority-owned Foreign Affiliates in 1998		Number of Foreign Affiliates		Amount of Sales		Number of Employees	
		Japanese -owned Affiliates	U.S. -owned Affiliates	Japanese -owned Affiliates	U.S. -owned Affiliates	Japanese -owned Affiliates	U.S. -owned Affiliates
Manufacturing		49.9%	36.7%	40.3%	47.0%	81.7%	57.6%
	Food	2.6%	3.1%	1.1%	5.4%	2.9%	6.3%
	Chemicals	6.9%	8.4%	4.1%	8.9%	5.6%	7.9%
	Metals	4.1%	3.1%	1.7%	1.7%	3.8%	2.8%
	Industrial Machinery	5.6%	5.0%	3.0%	8.1%	5.3%	8.2%
	Electronic Machinery	12.8%	4.1%	14.7%	5.1%	32.9%	10.5%
	Transpotation Equipment	5.9%	2.5%	11.2%	10.1%	14.3%	9.3%
	Others	12.1%	10.5%	4.5%	7.8%	16.9%	12.8%
Petroleum		0.1%	6.5%	0.1%	11.5%	0.0%	2.6%
Wholesale & Retail		26.3%	23.1%	49.6%	20.7%	11.9%	8.3%
Finance, Insurance Real Estate		4.8%	15.1%	2.9%	7.2%	0.8%	3.2%
Services		15.2%	12.3%	6.1%	6.7%	4.6%	14.0%
Others		3.6%	6.2%	0.9%	6.8%	1.0%	14.4%

: Source of the U.S. Data is "Foreign Direct Investment in the U.S. : Financial and Operating Data for U.S. Affiliates of Foreign Multinational Companies," from Bureau of Economic Analysis.

: Statistics of the U.S. Affiliates are cited from Hanson, Mataloni, and Slaughter (2001).

: Source of Japanese Data is the "Basic Survey of Overseas Business Activities."

: Statistics of Japanese Affiliates are based on Matsuura and Nagata (2004).

: An affiliate is a majority-owned foreign affiliate if more than 50% of its ownership is owned by parent firms abroad.

Table 1.12: Comparison of the Scale of Activity in Number, Sales, and Employment by Foreign Affiliates by Industry: Majority-Owned Japanese Affiliates and Majority-Owned U.S. Affiliates in 1998

design, quantity, delivery and other dimensions.

In addition to these common specifications, there are two different ways of defining offshore outsourcing. In the first method, according to some literature, researchers classify outsourcing activities as that should be between independent firms, or between firms in arm's-length relationship. In the second method, however, the ownership structure of the client and the agent is not explicitly specified. Therefore, the internal transactions, such as overseas transactions between a parent and its affiliates, are included in the statistics.

We consistently have the former definition in our mind, as the independence of the ownership structure is the important feature in the analysis. Offshore outsourcing in arm's-length relation (non-FDI activity) is then the clear alternative for having a foreign affiliate (FDI activity).

But the availability of statistics following the former definition is scarce, in reality. In some statistics available in Japan, for example, the definition of outsourcing may differ by each responding firm's conception of "contracting out of manufacturing, processing, or back-office functions to other firms" when answering surveys. The guideline of statistics does not explain what "other firms" refer to.

Although there is an ambiguity in the definition as we mentioned above, statistics still give some useful information about the offshore outsourcing activities. We will introduce these in this subsection.

The Basic Survey of Commercial and Manufacturing Structure and Activity (1998) investigates outsourcing of manufacturing processes of census-coverage manufacturing firms (with no size threshold). Among 118,300 firms surveyed, 60,105 (50.8%) firms do not use any outsourcing, 55,032 (46.5%) firms do only domestic outsourcing, 234 firms (0.2%) do only offshore outsourcing, and 2,929 (2.5%) firms do both domestic and offshore outsourcing.

Whereas 3,363 manufacturing firms conduct offshore outsourcing, 3,740 manufacturing firms are performing FDI (i.e. holding foreign affiliates). In addition, 21.4% of multinational firms are doing both FDI and offshore outsourcing. Therefore, among MNEs, or potential candidates of MNEs, offshore outsourcing is considered as an important strategy of firms.

Based on another survey targeted for large-sized manufacturing firms (responded by 5,528 firms), Ito, Tomiura, and Wakasugi (2007) summarize the results.[23] Table 1.13 shows the type of organization to outsource. As we mentioned, the statistics here regard contracting-out to one's own foreign affiliate as offshore outsourcing. Therefore, 39.1% of

[23]Data source is the *Survey of Corporate Offshore Activities* (2006). This is a questionnaire-based, one-shot survey by Research Institute of Economy, Trade and Industry. 21% of the respondents (1161 firms) give valid answers for contents and destinations of offshore outsourcing.

offshore contracts are between parents and their foreign affiliates. 45.4% of them are between Japanese and foreign firms. The remaining 15.4% are contracts with other Japanese firms or firms from third countries at each foreign country.

	Type of Organization to Outsource			
Task for Outsourcing	Own Affiliates	Foreign Firms	Others	Total
Jigs or Dies	4.1%	6.3%	2.2%	12.5%
Parts or Intermediates	11.9%	17.2%	6.2%	35.3%
Final Assembly	15.6%	15.0%	4.7%	35.3%
R&D	2.0%	1.3%	0.3%	3.6%
Info. Services	1.1%	1.3%	0.6%	3.0%
Customer Care	2.4%	1.5%	0.6%	4.5%
Professional	0.5%	1.4%	0.3%	2.1%
Others	1.7%	1.5%	0.4%	3.7%
Total	39.1%	45.4%	15.4%	100.0%

: Data source is the Survey of Corporate Offshore Activity (2006), a questionnaire based survey.
: This table is based on Ito, Tomiura, and Wakasugi (2007)
: The percentage in the total number of foreign outsourcing cases (the number of cases) is shown

Table 1.13: The Type of Organization to Outsource

Table 1.14 shows the location of firms to contract-out. China, where Taiwan and Hong Kong are included in this survey, occupies 52.8% of offshore contacting cases. ASEAN economies follow with the share of 22.9%. Therefore, we find that more than 75% of offshore contracting for Japanese firms are undertaken in Asia. In addition, the major roles firms contract out are production of basic parts and intermediate products, and final assembly. In total, 83% of activities for offshore contracts by Japanese manufacturing firms are directly connected to production.

1.4 Overseas Affiliates and International Business Networks in Asia

As participants in the so-called "world's factory," Asian economies are currently more influential as the bases of production for the world than as the bases of consumption within, although their presence as local sales channels is also increasing.[24]

Looking at production by product item, the number of automobiles produced in 2005 in Asia reached 24.66 million units, which surpasses the production at EU and NAFTA.

[24] "Asia" referred here covers east and South-East Asian economies.

	Region to outsource tasks					
Task for Outsourcing	China	ASEAN	other Asia	U.S.A. & E.U.	Rest of the World	Total
Jigs or Dies	7.4%	2.6%	1.9%	0.5%	0.1%	12.5%
Parts or Intermediates	19.2%	7.6%	4.4%	3.3%	0.9%	35.3%
Final Assembly	19.6%	8.6%	3.5%	2.9%	0.7%	35.3%
R&D	1.2%	0.5%	0.4%	1.4%	0.1%	3.6%
Info. Services	1.3%	0.7%	0.2%	0.8%	0.1%	3.0%
Customer Care	1.8%	0.9%	0.5%	1.2%	0.1%	4.5%
Professional	0.7%	0.4%	0.3%	0.7%	0.1%	2.1%
Others	1.7%	0.7%	0.3%	0.7%	0.2%	3.7%
Total	52.8%	21.9%	11.6%	11.5%	2.3%	100.0%

: Data source is the Survey of Corporate Offshore Activity (2006), a questionnaire based survey.

: This table is cited from Ito, Tomiura, and Wakasugi (2007)

: The percentage in the total number of foreign outsourcing cases (the number of cases) is shown.

Table 1.14: The Regions to Outsource Tasks

Production of synthetic fiber captures a global share of 67.3%. Production of personal computers holds a share of 96.8%, and production of DVD recorders/plsyers has a share of 92.2%.[25]

Activities of Japanese affiliates in Asia have some characteristics to facilitate this large amount of production. The first characteristic is that their activities accelerate intra-regional trade. Another key characteristic is that Japanese affiliates also promote intra-regional foreign direct investment to integrate their operating bases through a cross-border division of manufacturing processes.

East and South-East Asia have been increasing intra-regional trade ratio, while maintaining their export surplus outside the region. For example, the growth of intra-regional trade is especially high in electronic machinery, which has a 27% share of the total intra-regional trade.[26]

The production of Japanese affiliates is characterized by a cross-border division of labor across various countries and regions, which drives intra-regional trade. Compared with the EU and NAFTA, production in East and South-East Asia is carried out not so much at the industry level, but at a more elaborate process level.

According to a questionnaire made by Japan Industrial Policy Research Institute in 2007, 77% of the Japanese manufacturing firms mentioned the increase in the number of countries from which they could procure parts and materials, and to which they could

[25]Source: World Motor Vehicle Statistics, Fiber Organon, World-wide Production of Major Electronics from 2005 to 2007, respectively.

[26]Source: RIETI-TID database, Japan.

export. In addition, 63% of firms pointed out the increase in the cross-border divisions of labor, not only between Japan and others, but also among countries not including Japan. According to the database of foreign affiliates, 30.5% of manufacturing affiliates in China carry out procurement from ASEAN, and 40.0% of affiliates in ASEAN do so from China.

As another key characteristic, intra-regional foreign direct investments are compatible with the trend toward intra-regional trade of intermediates and final goods. In 2005, the amount of foreign direct investment carried out in the world actually declined from 1.34 trillion dollars in 2000 to 0.94 trillion dollars in 2005.[27] However, the amount of foreign direct investment within the Asian region increased. The increase in investment by Japan was particularly large, rising from 2.67 billion dollars in 2000 to 14.39 billion dollars in 2005. In addition, intra-regional investments from Korea, China, and ASEAN have also increased.

Not only the flow of investment, functions of each existing affiliate are also designed according to a firm's position in the supply chains of Asia. For example, more than 50% of manufacturing affiliates in China, ASEAN, and NIES hold the function of exporting products as their operation. In addition, 81% of Chinese manufacturing affiliates, 70% of manufacturing firms in ASEAN, and 30% of manufacturing firms in NIES hold the function of assembly plants.[28]

In the next chapters, we focus on these production activities carried out in Asia and decisions of parent firms. Through the ownership decision taken by Japanese multinational firms, we investigate what would promote outward direct investments, and what would discourage those, and what would alternatively be taken.

[27]Source: *Balance of Payment Statistics*, by the IMF. The statistics are based on real 2000 price.

[28]Source: Japan Industrial Policy Research Institute (2007). In the questionnaire, firms describe the function they hold in the business network of multinational firms. Multiple answers are permitted.

Chapter 2

Ownership Determination in Foreign Direct Investment: A Model

2.1 Introduction

Our interest is to describe the process that drives foreign affiliates into various organizational forms. We address the issues of when MNEs choose joint ownership over full internalization and what determines the percentage of ownership and its variation across firms.

There is a body of literature in which the choices between integration and outsourcing are discussed.[1] In the discussion, however, managerial decisions and investments in partially-owned entities receive little attention.

We propose that the classification into two types, integration or outsourcing, does not closely correspond to the corporate structure in reality, since foreign affiliates may have local owners or investors, in addition to foreign owners. For example, about a half of the affiliates in Japan by Foreign Direct Investment (FDI) are not fully integrated according to the statistics we use in our empirical analysis. It is also reported that most of the FDI in the world are performed as Mergers and Acquisitions (M&A), according to the *World Investment Report* (UNCTAD) and the *International Financial Statistics* (IMF).[2] In the

[1] Spencer (2005), Gattai (2005), and Helpman (2006) document surveys on two organizational choices and two location choices: a binary choice of integration or outsourcing and a choice of doing so at home or abroad. Chapter 5 of Navaretti and Venables (2004) also documents some trade-offs between internalized and arm's-length transactions.

[2] IMF reports in current values, while UNCTAD reports in book values. Therefore here we avoid simply comparing the two numbers.

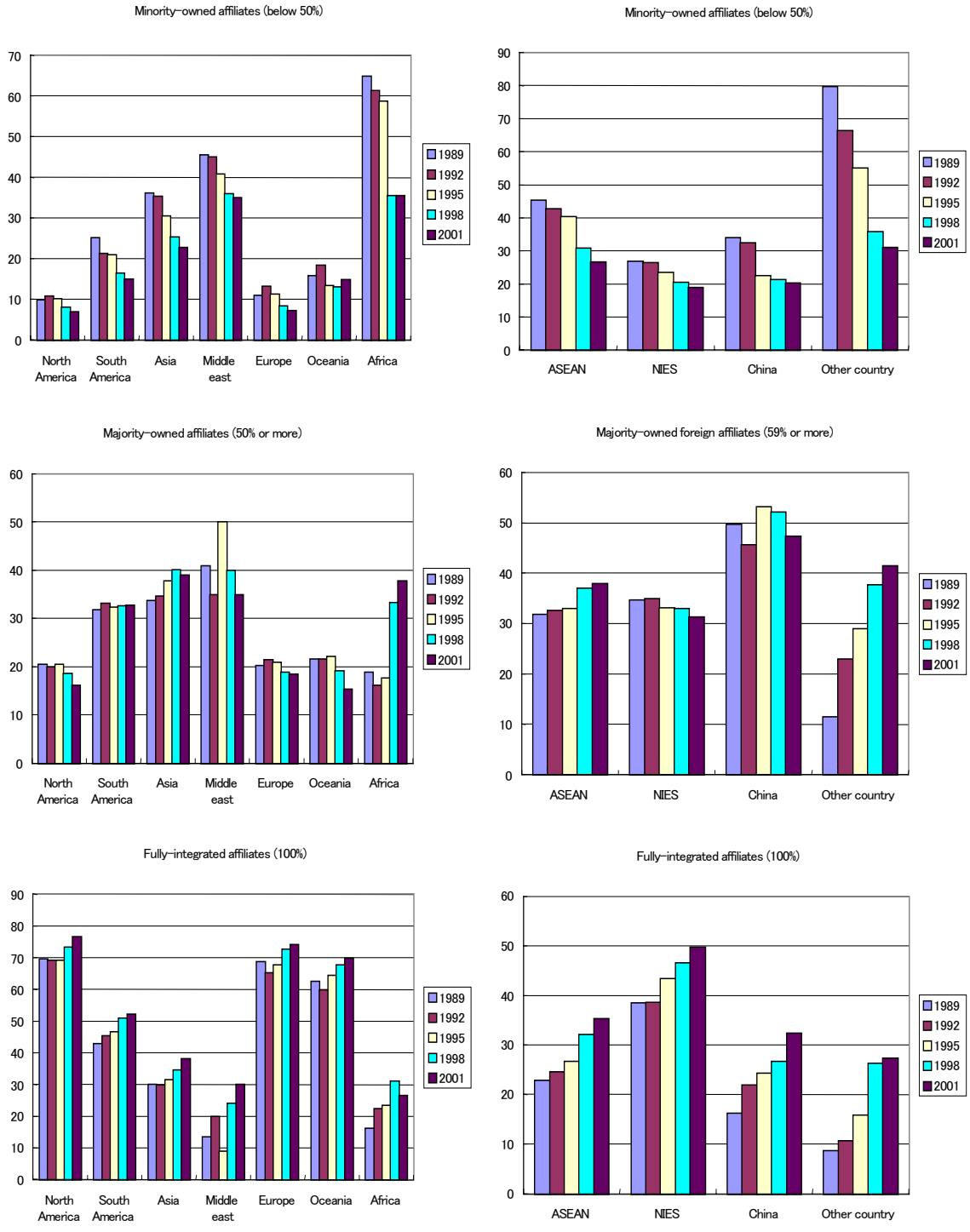
U.S., the Bureau of Economic Analysis (BEA) reports that more than 90% of FDI are used to fund firms already existing within host economies. Therefore, it is unreasonable to assume that foreign affiliates do not have local firms as owners, even when the affiliates are integrated to parent firms. This is one of the reasons that we consider joint ownership as an important choice.

In addition, we take an interest in joint ownership because less than 100% ownership of a firm presents a significant difference from full ownership due to the presence of local firms. In terms of legal and practical operations of a firm, profit or loss of an affiliate and legal property rights on corporate assets are rigidly allocated according to the percentage of ownership. Financial treatment and managerial control require written agreements of a board of directors, in which the managers are allocated by ownership stake. These aspects are important for affiliates themselves as well as for parent firms. However, few studies have been conducted with regard to the selection of a percentage of ownership (Asiedu and Esfahani [2001], Nakamura and Xie [1998]). [3]

In Figure 2.1, we show how the organizational forms of Japanese-owned foreign affiliates have changed from 1989 to 2001. We classify Japanese-owned foreign affiliates into 3 categories: fully integrated (100% owned) affiliates, majority-owned, and minority-owned. Then, we show the presence of each category by region. We first sort the affiliates into 7 regions of the world in the left-hand side of Figure 2.1. We also classify Asian affiliates, in which more than one half of Japanese-owned foreign affiliates are located, into 4 areas (i.e., ASEAN, NIES, China, and others) in the right-hand side of Figure 2.1. The upper figures show the composition of minority-owned foreign affiliates, in which Japanese investor ownership is less than 50%. The middle figures show the share of majority-owned foreign affiliates, in which more than or equal to 50%, but less than 100%, is owned. The bottom figures are for fully integrated affiliates.

Although the distribution of ownership percentage is widely different across host countries, we observe a common trend across locations. We find that there is an increasing proportion of fully owned foreign affiliates and a decreasing proportion of minority-owned foreign affiliates. In addition, these trends are observed for affiliates around the world.

[3] The relation between foreign firms and local firms also receives attention in the analysis of cross-border spillovers. For example, Blyde, Kugler, and Stein (2004) discuss generic spillovers that are most plausible when a technical gap between foreign affiliates and local firms is large. This occurs because foreign firms have little incentive to restrict the flow of useful information. Aitken, Hanson, and Harrison (1997) support this view for foreign-owned Mexican firms. Other recent evidence is provided by Smarzynska (2004) with regard to Lithuania, and Blalock (2001), Indonesia.



* % in Y axis.
* Author's calculation (Data Source: Basic Survey on Overseas Business Activity, 1989-2001)

Figure 2.1: Ownership of Japanese MNE for Foreign Affiliates

Desai, Foley, and Hines (2002) also report a shift toward full integration for U.S.-owned affiliates. Therefore, there may be common explanations across countries, such as falling costs for communication and increasing technological sophistication.[4] Since firms and industries are directly affected by these economic situations, the analysis using industry-level and firm-level factors is useful to investigate this phenomenon. However, there is little empirical research, and the results are still not deterministic.

In our empirical analysis, we investigate the new FDI projects from 1996 to 2002 by Japanese MNEs in Asian countries. To obtain the best connection between a model and an empirical analysis from the data, we consider the case in which an MNE in a developed economy establishes its foreign affiliates in a less-developed economy.

In our model framework, we discuss the trade-offs between three organizational forms. A potential foreign investor chooses among (1) setting up a fully integrated affiliate, (2) setting up a jointly owned affiliate, and (3) outsourcing production to a local firm (without setting up an affiliate). On the other hand, a local firm responds by (1) working independently in a local market (as an outside option), (2) participating in a foreign affiliate as a co-investor, or (3) agreeing on a contract to provide final goods to foreign markets.

Outsourcing, introduced here, is actually another key feature of overseas activities especially in recent years. In spite of the importance of outsourcing in business activity, formal definitions and statistics of oursourcing are not consolidated yet. However, we have clearly observed an increasing share of overseas sales and production activity compared to the size of domestic activities, as well as a decreasing number of foreign affiliates in developed economies in recent years. This phenomenon indirectly shows that some activities previously performed by the foreign direct investment or by foreign affiliates are being replaced by outsourcing activities.

In the dichotomous choice of full integration or outsourcing, the key issue is whether a multinational firm can take advantage of a local firm's strengths. A local firm has advantages related to legal and political management. A local firm can avoid the bureaucratic maze, such as obtaining licenses and permits. It also has managerial know-how with regard to hiring and training. In outsourcing, an MNE makes complete use of the benefits of a local firm for its production and service.

A local firm, however, has a disadvantage in technological knowledge and its effective use, which is an advantage for a fully integrated affiliate. Due to limited processing technology, a local firm may not be able to produce products fully tailored to an MNE's order, and

[4]Smarzynska and Wei (2000) also suggest that factors such as corruption and tax regimes are key factors in organizational choice.

then investments are partially wasted. In full integration, an MNE is, therefore, assumed to stand alone without using a local firm's ability. [5]

When we compare joint ownership, investor benefits and losses are combined. We look specifically at how an ownership allocation changes the marginal benefits and losses by eliciting incentives for a higher expected utility. We argue that a marginal benefit from a unit of expected technology is greater in joint ownership rather than in outsourcing. We also state that a marginal gain from a unit reduction of required know-how is greater in joint ownership than in full integration.

This paper is organized as follows. Section 2 contains a description of our model that clarifies the costs and benefits of the three organizational forms. Section 3 is an explanation of the timing of events and decisions under each organizational form. Section 4 is a comparison of the three organizational forms. In addition, we discuss the percentage of ownership in joint ownership. The last section contains the concluding remarks and an empirical application of our model.

2.2 Model

2.2.1 Supply and Demand

We consider the production in industry Y. In industry Y, the products are differentiated by firm-specific variety (brand). There are n varieties of goods for n sellers of final goods in a monopolistic competition setting. n is the fixed number of varieties (final sellers), although it is possible to relax this assumption.

The production by a final seller indexed by i is given by the Cobb-Douglas production function (supply function) using capital and labor as inputs. (The functional form (2.1) shown in Antras [2003] is useful to handle computations easily.) Investment in machinery and equipment is referred to as capital, K, and the number of employees is referred to as labor investment, L.

$$y(i) = \left(\frac{K(i)}{\beta}\right)^{\beta} \left(\frac{L(i)}{1-\beta}\right)^{1-\beta} \tag{2.1}$$

[5] According to a questionnaire for jointly owned foreign affiliates in developing countries by Miller et al. (1997), 74% of the questioned local investors in developing countries acknowledge MNEs' contribution in processing technology, 72% for product technology, and 70% for international reputation. On the other hand, 70% of the questioned MNEs give high ratings to the local investors' knowledge of local politics, and 68% value knowledge of government regulation and local customs.

The consumer has the Cobb-Douglas tastes for two types of goods, differentiated goods Y and non-differentiated goods (numeraire) M,

$$D = Y^{\mu} M^{1-\mu},$$

where μ is a constant, representing the expenditure share of differentiated goods. The quantity index, Y, is a function defined over a continuum of varieties of differentiated goods; $y(i)$ denotes the consumption of each available variety. We assume that Y is defined by a Constant Elasticity of Substitution (CES) function:

$$Y = \left(\int_0^n y(i)^{\alpha} di \right)^{\frac{1}{\alpha}},$$

where $\frac{1}{1-\alpha}$ shows the elasticity of substitution among any two varieties. In monopolistic competition, a market power of each variety is given by $\frac{1}{\alpha}$. A higher value of α shows a lower market power for a firm and more intense competition in a market.

Given income E and a set of prices, p_m, for non-differentiated goods and $p(i)$ for differentiated goods, the budget constraint is as below:

$$p_m M + \int_0^n p(i) y(i) di = E$$

Then, each seller faces the following demand:

$$\begin{aligned} y(i) &= \frac{\mu E}{\int_0^n p(j)^{-\frac{\alpha}{1-\alpha}} dj} p(i)^{-\frac{1}{1-\alpha}} \\ &= A p(i)^{-\frac{1}{1-\alpha}}, \end{aligned} \tag{2.2}$$

where $p(j)$ is the price level defined by other firms, and μE is the fixed amount of expenditure for industry Y. We use $A = \mu E / \int_0^n p(j)^{-\frac{\alpha}{1-\alpha}} dj$ to denote the volume of demand for industry Y. A seller of each variety faces demand $y(i)$ in Equation (2.2) by charging $p(i)$. Then, the sales revenue for each pair is given by the gross revenue function $R(i)$. Plugging the production function in Equation (2.1) into the revenue function, we show the revenue as a function of physical capital and labor.

$$\begin{aligned} R(i) &= p(i) y(i) \\ &= A p(i)^{-\frac{\alpha}{1-\alpha}} \\ &= A^{1-\alpha} y(i)^{\alpha} \\ &= A^{1-\alpha} \left(\frac{K(i)}{\beta} \right)^{\alpha\beta} \left(\frac{L(i)}{1-\beta} \right)^{\alpha(1-\beta)} \end{aligned} \tag{2.3}$$

2.2.2 Matching

We have in mind a situation in which a final seller (a principal) is now going to make use of manufacturing opportunities in an overseas location. We assume that final products are sold with a brand name of a final seller.

We assume that a principal and an agent are randomly matched, since the quality of the matching is not observable for either party before the production. The decisions are then made based on the expected ability of local industry. Both observe how the local ability is distributed in an industry, but they do not observe where their own pair is in the distribution prior to a processing activity. We also assume difficulty in switching partners. After contracts and investments are made, neither side can afford to break the existing agreement and make another contract.

2.2.3 Stages of Events

A final seller chooses the organization that brings the highest expected utility given an agent's choice to participate. Both a principal and an agent have a risk-neutral preference.[6]

1. One of the organizational forms is chosen by an MNE. (Joint ownership and outsourcing are chosen when an MNE finds a local agent to participate.)

2. Investment of production factors is performed. The amount of these inputs is contractible in contract form and enforceable in any organizational form.

3. Processing of products is performed. The efficiency of the processes (i.e., yield of products) is affected by efforts taken by the parties. The degree of effort is not contractible.

4. A local producer's absorptive capacity (denoted as θ_i) is realized in joint ownership and in outsourcing.[7]

5. Output becomes observable. (Some of those may not be qualified for sales.) Only the successfully produced products are sold. Payoffs are allocated according to the contracted method.

[6] The final seller takes the following factor as exogenously given information upon entry: home-related factors (capital intensity and market competition), firm-specific factors (required local knowledge), host-related factors (expected technological ability, wage in labor market), and cost of capital (r_p, r_a).

[7] θ_i refers to a local producer's actual technology, compared to that of final sellers in developed economies.

In the first stage, we assume that investors choose one of the three organizations to maximize their expected utility. Owners benefit from the expected profit and the time they can use for leisure. This assumption follows the setup by Jensen and Meckling (1976), Puga and Trefler (2002), and Feenstra and Hanson (2005). The expected utility is composed of both pecuniary and non-pecuniary components.

In the second stage, we assume that all the tangible assets are invested optimally. We do not assume a hold-up (or a post-contractual opportunism) because of the rigidity of the contracts and the reputation that producers need to keep. The parties usually come to well-informed decisions with regard to the products (e.g., orders in design, function, quantity, and delivery). In addition, under-achievement in production leads to a fatal loss of reputation in their business. Lafontaine and Slade (1998) state a set of empirical regularities in franchiser and franchisee relations. There exist surprisingly high degrees of compliance regarding contracts and uniformity across franchisees. Lafontaine and Oxley (2001) further show that the compliance applies to franchisees overseas (e.g., U.S. and Canadian firms operating in Mexico.)

In the third stage, we regard efforts as an intangible factor of production, which are not observable and not contractible. Each party, foreign or local, determines what effort should be taken to maximize its expected utility. The efforts enhance the control of production; however, time is required to implement the new measures. This assumption is widely expressed in the number of literature, as in, for example, Grossman and Hart (1986), Hart (1995), and Aghion and Tirole (1997).

In the fourth stage, we consider whether a local side can catch up to a certain technological knowledge of MNEs. We call this absorptive capacity. If only one half of an agent's products pass the qualifications specified by an MNE, we measure the absorptive capacity as 1/2, for example. A similar notion to the "absorptive capacity" is employed in other research on matching issues. For example, Rauch and Casella (2003) denote it as "the quality of the producers' match," and Grossman and Helpman (2003) call it the "productivity difference between specialized and integrated producers of inputs." Puga and Trefler (2002) describe it as the "degree of substitutability between each other's creative efforts."

In the last stage, we assume that a pre-defined contract is enforceable for the allocation of profit and loss. We do not assume any renegotiation unless it is admitted in a contract. In the next subsection, we discuss what a contract defines. We also explain how the expected utilities differ by corporate structure.

2.2.4 The Role of Ownership

We now discuss the manner in which a percentage of ownership facilitates production processes and payoff allocations between two parties. We focus on three properties defined by the allocation of equity shares: (1) allocation of realized payoff, (2) managerial control by board of directors, and (3) residual claims and provision of fixed assets. Here, we cite a joint venture contract of a foreign party and a local party in China.
(Source: $http://www.dezshira.com/sample\_jv\_contract.htm$).[8]

- Allocation of realized payoff

  Article 5

  The organizational form of the Company is a limited liability company. Each party of the Company is liable to the Company within the limit of the capital subscribed by it. The profits, risks and losses of the Company shall be shared by the parties in proportion to their contributions of the registered capital.

  Article 14

  Both party A and Party B agree that a technology transfer agreement shall be signed between the Company. The technology transfer fee shall be paid in royalties.

  Article 5 states that a realized profit and loss are shared according to the percentage of contribution (ownership). In addition, as in Article 14, parties may agree on a lump-sum payment in the form of royalties. This allows a local firm to pay an MNE or an MNE to pay a local firm for compensation.

- Managerial control by board of directors

  Article 30

  The Company shall establish a Management Office which shall be responsible for its daily management. The Management Office shall have a General Manager, appointed by party [A], [10] Deputy General Managers, [7] appointed by Party A, [3] by Party B. The General Manager and Deputy General Managers whose terms of office are [2] years shall be appointed by the Board of Directors.

[8] The contract is cited verbatim. The contract covers the followings issues as well: (1) the purpose, scope, and scale of production, (2) transfer of technology, (3) the board of directors, (4) labor management, (5) taxes, finance, and audit, (6) duration of the joint venture, (7) the disposal of assets after the expiration of the duration, (8) amendment, alternation, and discharge of the contract, (9) liability for breach of contract, and (10) settlement of disputes. Some of these features are cited in the Appendix.

Article 30 implies that managerial knowledge is also provided in proportion to the contribution for the ownership.

- Residual claims and provision of fixed assets

Article 9

The total amount of investment in the Company is RMB [ ] (or a foreign currency agreed upon by both parties)

Article 10

Investment contributed by the parties is RMB [ ] which will be the registered capital of the Company; of which: Party A shall pay RMB [ ], account for [70]%; Party B shall pay RMB [ ], account for [30]%.

Article 11

Both Party A and Party B will contribute the following as their investment:

Party A:	Party B:
Cash: RMB [ ],	Cash: RMB [ ],
Machines and equipment RMB [ ],	Machines and equipment RMB [ ],
Premises [ ] RMB,	Premises [ ] RMB,
The right to use the site [ ] RMB,	The right to use the site [ ] RMB,
Industrial property [ ] RMB,	Industrial property [ ] RMB,
Others [ ] RMB,	Others [ ] RMB,
Total [ ] RMB in all,	Total [ ] RMB in all.

Article 13

In case any party to the joint venture intends to assign all or part of his investment subscribed to a third party, consent shall be obtained from the other party to the joint venture, and approval from the examination and approval authority is required. When one party to the joint venture assigns all or part of his investment, the other party shall have preemptive right.

Article 49

Upon the expiration of the duration, or termination before the date of expiration of the joint venture, liquidation shall be carried out according to the relevant law. The liquidated assets shall be distributed in accordance with the proportion of investment contributed by Party A and Party B.

Articles 9, 10, and 11 specify the contribution (type of assets and amount of investments) given by the two parties. Article 13 restricts a party from changing the amount and the content of contribution without an approval. Article 49 specifies the residual claims on contributed assets. The remaining assets are allocated according to the percentage of contributions.

Given these roles of ownership, we set up a framework to determine how ownership allocation affects the expected utility.[9]

Allocation of Profits

	MNE	Local Producer
Integration (I)	π^I	(n/a)
Joint ownership (J)	$\phi_i \pi^J$	$(1-\phi_i)\pi^J$
Outsourcing (O)	$(p_i - \bar{p})\tilde{y_i}$	$\bar{p}\tilde{y_i} - (rK + wL)$

Table 2.1: Allocation of Profit

Table 2.1 shows the allocation rule of profits. π denotes the profit (revenue minus cost). In a fully owned affiliate, an MNE takes hold of all of the profits. When parties split equity stakes, profits are allocated according to their ownership $\phi_i \in (0, 1)$, specified at the time of the contract. When an MNE contracts out the production to a local producer, the MNE promises to pay the reward of $\bar{p}$ per unit of products. $\tilde{y_i}$ denotes the number of products successfully produced. The payment is in proportion to the quantity of products that they purchased.

Yield of Successfully Produced Products

	MNE	Local Producer
Integration	$e_p^I(1-\lambda_i)$	(n/a)
Joint ownership	$[\phi_i e_p^J + (1-\phi_i)\theta_i e_a^J](1-\phi_i\lambda_i)$	
Outsourcing	(n/a)	$\theta_i e_a^O$

Table 2.2: Yield of Successfully Produced Products

Table 2.2 shows the yield of successfully produced products. We assume that the yield depends on both technological performance on processing and managerial knowledge.

First, the performance on processing is related to an effort, such as the mechanical knowledge for specialized tools and equipment and the research to remain competitive in relation to the latest incremental processing technique. Any party in charge of processing

[9]The subscript i here denotes firm-specific variables of firm i, p shows the choice of an MNE (a principal), and a shows the choice of a local producer (an agent). The superscripts I, J, and O show the organizational forms.

must make the effort. The efforts help producers to achieve an enhanced yield of products in return for reduced time.

Secondly, the location-specific managerial method is the other factor for yield. The yield is discounted if a producer is unfamiliar with local conventions and sacrificing production opportunities. A foreign producer must learn an efficient procurement of local materials, understand the local business environment and conventions, or hire and train workers.[10] In $(1-\lambda_i)$, 1 denotes the necessary knowledge about local customs, and λ_i shows the location-specific know-how that a new entrant should acquire. The loss to the yield is proportional to the required knowledge to learn.

We then combine two factors. We assume that an effort for processing is an independent choice with the local knowledge. The required local knowledge is defined by the prior experience by an MNE at host countries. A producer acquires a processing technique regardless of its operation abroad.

In full integration, the yield depends on how an MNE performs in product processing and how large a disadvantage an MNE has in local management. The effort is expressed by e_p^J, and the lack of know-how, by λ_i.

In joint ownership, we assume that the effort of each party is weighted by the ownership control it has. This occurs because of the limited managerial control and limited provision of assets specified in a contract. The contribution by a local producer is further limited by its absorptive capacity for processing techniques, denoted by θ_i. If the degree of effort is the same, a more capable local producer can contribute more to the yield of final goods. We show this feature with $\phi_i e_p^J + (1-\phi_i)\theta_i e_a^J$. Although partial ownership (ϕ_i) discounts an MNE's effort on technology, delegation of ownership $(1-\phi_i)$ instead reduces the local managerial knowledge to learn.[11]

In outsourcing, the yield solely depends on a local firm's effort and ability. As there is no requirement for location-specific know-how for a local agent, outsourcing does not involve a further reduction of yield.

Provision of Fixed Assets

This section considers the provision of fixed assets, i.e., plant, property, and equipment. As shown in the contract (cf. Articles 10 and 11), we assume that investment responsibility

[10] In general, the local labor force is immobile, and the know-how of employing workers and the skills of these workers remains local information.

[11] Participation of a local producer provides an MNE with better location-specific know-how. We consider this supplemental effect by $1-\lambda_i+(1-\phi_i)\lambda_i = 1-\phi_i\lambda_i$.

Stage 1	MNE	Local Producer
Integration	$1 - e_p^I$	n.a.
Joint ownership	$1 - e_p^J$	$1 - e_a^J$
Outsourcing	1	$1 - e_a^O$

Table 2.3: Time for Leisure

follows the ownership allocation that was agreed upon (i.e., $K_P : K_A = \phi_i : 1 - \phi_i$). Interest rates for an MNE's credibility r_p apply to both fully and partially owned foreign affiliates, and interest rates for a local producer's credibility r_a apply to legally independent local producers. To simplify, we assume $r_p < r_a$. It implies that local producers (in less developed countries) are required to earn a higher rate of return in exchange for their higher country risk. This also means that a local producer can benefit from the lower cost of capital more than a contractual supplier.

Time for Leisure

In addition to the explicit cost and benefit of investment and payoff, we discuss the effort spared and the time left. We set the total time as 1 to normalize. The time spent for efforts is a loss to each party and is not shared with another party. This leads to a different utility maximization problems for each of the two parties respectively.

Expected Utilities

We assume that each local producer has an absorptive capacity θ_i. For all the local producers, θ_i is distributed with an arbitrary but known probability density function $g(\theta)$, where $\theta \in (0, 1)$. The exact realization of the degree of absorptive capacity is unknown by either party until they actually work together. Therefore, the expected utility is based on the *expected* value of θ,

$$E[\theta_i] = \bar{\theta} \text{ where } i \in [0, n]$$

Therefore, each firm expects its utility based on the average absorptive capacity for each industry. Hereafter, we abstract i for firm i to ease the notation. We instead use subscript $k = i, j, o$ to denote the expected price (p_k), the planned volume of products (y_k), and the unit cost (c_k) under each organizational form. $E[U_A^I] = \delta$ denotes the outside option of matching, where a local producer works independently in the local market.

- An MNE's expected utility from the three different organizational forms

$$\begin{aligned} E[U_P^I] &= [p_i y_i e_p^I(1-\lambda) - c_i y_i](1-e_p^I) \\ E[U_P^J] &= \phi[p_j y_j[\phi e_p^J + (1-\phi)\bar{\theta} e_a^J](1-\phi\lambda) - c_j y_j](1-e_p^J) + \tau \\ E[U_P^O] &= (p_o - \bar{p}) y_o e_a^O \bar{\theta} \text{ where } \bar{p} \geq c_o \end{aligned} \tag{2.4}$$

- A local agent's expected utility from the three different organizational forms.

$$\begin{aligned} E[U_A^I] &= \delta \\ E[U_A^J] &= (1-\phi)[p_j y_j[\phi e_p^J + (1-\phi)\bar{\theta} e_a^J](1-\phi\lambda) - c_j y_j](1-e_a^J) - \tau \\ E[U_A^O] &= [\bar{p} y_o e_a^O \bar{\theta} - c_o y_o](1-e_a^O) \end{aligned} \tag{2.5}$$

2.3 Choice of Corporate Structure

We compute the choices of players and expected utilities they obtain. Both a principal and an agent are risk-neutral players. As for the initial investments K, and L, the investors anticipate that not all of their investments materialize to final goods. So they control the initial volume to avoid an over-investment. We use σ_k for $k = i, j, o$ to denote the expected yield ($E[Pr(Yield_k)] = \sigma_k$). From Table 2.2, the expected yields are given as follows.

$$\begin{aligned} Pr(Yield_i) &= \sigma_i = e_p^I(1-\lambda) \\ E[Pr(Yield_j)] &= \sigma_j = [\phi e_p^J + (1-\phi)\bar{\theta} e_a^J](1-\phi\lambda) \\ E[Pr(Yield_o)] &= \sigma_o = e_a^O \bar{\theta} \end{aligned}$$

It is important to remind that the terms we use hereafter are the function of σ_k. Firstly, The planned production volume y_k is given by initial investments K_k, and L_k.

$$y_k = \left(\frac{K_k}{\beta}\right)^{\beta} \left(\frac{L_k}{1-\beta}\right)^{(1-\beta)}$$

Accordingly, the expected (not actual) final production is given by $y_k\sigma_k$. Lastly, the expected (not actual) sales price p_k is given as a function of functions $y_k\sigma_k$. From the

demand equation, the relation between the expected final volume of production ($y_k\sigma_k$, denoted as $\tilde{y_k}$) and the expected sales price p_k is shown as below;

$$\begin{aligned} \tilde{y_k} &= y_k\sigma = Ap_k^{\frac{-1}{1-\alpha}} \\ p_k &= (\frac{A}{y_k\sigma_k})^{1-\alpha} \end{aligned}$$

The expected revenue $E[R_k]$ is also shown as the following expression.

$$\begin{aligned} E[R_k] &= p_k\tilde{y_k} && (2.6) \\ &= p_k y_k \sigma_k && (2.7) \\ &= Ap_k^{-\frac{\alpha}{1-\alpha}} \\ &= A^{1-\alpha} y_k^{\alpha} \sigma_k^{\alpha} \\ &= A^{1-\alpha} \left(\frac{K_k}{\beta}\right)^{\alpha\beta} \left(\frac{L_k}{1-\beta}\right)^{\alpha(1-\beta)} \sigma_k^{\alpha} \end{aligned}$$

2.3.1 Full-Integration

An MNE decides inputs of K and L and the level of efforts. These are chosen taking an expected yield into account. We solve out the expected product price, p_i, the targeted level of production y_i, and unit cost c_i. In fully-integrated firm, we do not need to assume a uncertain outcome of the ability of an agent. Therefore, the yield and the sales price are defined by an MNE's choice and fixed factors. (We suppress the superscript of I in e_p in this section.)

$$\begin{aligned} \max_{K_i, L_i, e_p^I} E[U_P^I] &= E[\pi_p^I](1-e_p) && (2.8) \\ &= (E[R_i] - rK_i - wL_i)(1-e_p) \\ &= (p_i y_i \times Pr(Yield_i) - rK_i - wL_i)(1-e_p) \\ &= [A^{1-\alpha}(\frac{K_i}{\beta})^{\alpha\beta}(\frac{L_i}{1-\beta})^{\alpha(1-\beta)}\sigma_i^{\alpha} - rK_i - wL_i](1-e_p) \\ &= [ge_p^{\alpha} - rK_i - wL_i](1-e_p) \end{aligned}$$

where

$$\begin{aligned} g_i &= A^{1-\alpha}(\frac{K_i}{\beta})^{\alpha\beta}(\frac{L_i}{1-\beta})^{\alpha(1-\beta)}(1-\lambda)^{\alpha} \\ \sigma_i &= e_p(1-\lambda) \end{aligned}$$

We solve the utility maximizing choice of K_i, L_i, and e_p^I. The first order conditions for these variables are listed as follows. Equation (2.9) is the first order condition of K_i, given e_p, L_i. Equation (2.10) is the first order condition of L, given e_p, K_i. Equation (2.11) is the first order condition of e_p, given K_i, L_i.

$$
\begin{aligned}
K_i &= [\frac{\alpha}{r} A^{1-\alpha} \sigma_i^{\alpha} \beta^{1-\alpha\beta} (1-\beta)^{-\alpha(1-\beta)} L_i^{\alpha(1-\beta)}]^{\frac{1}{1-\alpha\beta}} && (2.9)\\
L_i &= [\frac{\alpha}{w} A^{1-\alpha} \sigma_i^{\alpha} \beta^{-\alpha\beta} (1-\beta)^{1-\alpha(1-\beta)} K_i^{\alpha\beta}]^{\frac{1}{1-\alpha(1-\beta)}} && (2.10)\\
\frac{\partial E[U_P^I]}{\partial e_p^I} &= \frac{\partial E[\pi_P^I]}{\partial e_p}(1-e_p) - E[\pi_P^I] = 0 && (2.11)\\
&= g_i \alpha e_p^{\alpha-1}(1-e_p) - [g_i e_p^{\alpha} - rK_i - wL_i] = 0\\
&= g_i\{\alpha e_p^{\alpha-1} - (1+\alpha)e_p^{\alpha}\} + rK_i + wL_i = 0\\
&\Leftrightarrow \; e_p^{\alpha}\{(1+\alpha) - \frac{\alpha}{e_p}\} = \frac{rK_i + wL_i}{g_i}
\end{aligned}
$$

Combining the best responses of K_i in equation (2.9) and L_i in (2.10), we get the optimal volume of investments in equation (2.12) and (2.13), given e_p.

$$
\begin{aligned}
K_i &= \frac{\alpha\beta}{r} A (\frac{r^{\beta} w^{1-\beta}}{\alpha})^{\frac{-\alpha}{1-\alpha}} [e_p(1-\lambda)]^{\frac{\alpha}{1-\alpha}} && (2.12)\\
&= \frac{\beta}{r} h\\
L_i &= \frac{\alpha(1-\beta)}{w} A (\frac{r^{\beta} w^{1-\beta}}{\alpha})^{\frac{-\alpha}{1-\alpha}} [e_p(1-\lambda)]^{\frac{\alpha}{1-\alpha}} && (2.13)\\
&= \frac{1-\beta}{w} h
\end{aligned}
$$

where

$$
\begin{aligned}
h_i &= \alpha A (\frac{r^{\beta} w^{1-\beta}}{\alpha})^{\frac{-\alpha}{1-\alpha}} [e_p(1-\lambda)]^{\frac{\alpha}{1-\alpha}}\\
&= A\alpha^{\frac{1}{1-\alpha}} (r^{\beta} w^{1-\beta})^{\frac{-\alpha}{1-\alpha}} [e_p(1-\lambda)]^{\frac{\alpha}{1-\alpha}}
\end{aligned}
$$

We solve the optimal level of effort from the first order condition of e_p^I in equation (2.11). We substitute the value of K_i from (2.12), L_i from (2.13) into (2.11).

$$(2.11) \quad \Leftrightarrow \quad e_p^{\alpha}\{(1+\alpha) - \frac{\alpha}{e_p}\} = \frac{rK_i + wL_i}{g}$$

where

$$\begin{aligned} rK_i + wL_i &= \beta h_i + (1-\beta)h_i = h_i \\ g_i &= A^{1-\alpha}(\frac{h_i}{r})^{\alpha\beta}(\frac{h_i}{w})^{\alpha(1-\beta)}(1-\lambda)^{\alpha} \\ &= A^{1-\alpha}(r^{\beta}w^{1-\beta})^{-\alpha}(1-\lambda)^{\alpha}h_i^{\alpha} \end{aligned}$$

Then, the right-hand-side is

$$\begin{aligned} \frac{rK_i + wL_i}{g_i} &= A^{\alpha-1}(r^{\beta}w^{1-\beta})^{\alpha}(1-\lambda)^{-\alpha}h_i^{1-\alpha} \\ &= e_p^{\alpha}\alpha \text{ , by substituting h} \end{aligned}$$

Therefore,

$$(2.11) \quad \Leftrightarrow \quad e_p^{\alpha}\{(1+\alpha) - \frac{\alpha}{e_p}\} = e_p^{\alpha}\alpha \tag{2.14}$$

$$\Leftrightarrow \quad e_p^* = \alpha \tag{2.15}$$

$$\Rightarrow \quad \sigma_i^* = e_p^*(1-\lambda) = \alpha(1-\lambda) \tag{2.16}$$

The first order condition in equation (2.11) is rewritten in (2.14). For $0 < e_p^I \leq 1$, the condition holds when we equate the second terms, since the first terms (e_p^{α}) is strictly positive. The optimal effort level is then defined in equation (2.15). We also compute the expected yield σ^* in equation (2.16).

In full integration, the level of effort is independent of the amounts of investment chosen. The effort increases as the products become more substitutable and the competition becomes more intense. We finally substitute σ^* and e_p^* into (2.8) to get the expected utility.

$$E[U_P^I] = A(1-\alpha)^2(\frac{r^{\beta}w^{1-\beta}}{\alpha})^{\frac{-\alpha}{1-\alpha}}[\alpha(1-\lambda)]^{\frac{\alpha}{1-\alpha}} \tag{2.17}$$

2.3.2 Joint Ownership

There are two risk-neutral decision makers in a jointly-owned firm. First an MNE choose the percentage of ownership, the amount of investment, and the upfront transfer if necessary. Both a principal and an agent then take efforts in production. We assume the timing of events as follows.

1. A final seller (a principal) chooses its share of ownership $\phi \in (0,1)$ for a setup of a jointly-owned enterprise with a local producer (an agent). In a contract between a principal and an agent, a principal specifies the amounts of investment in K_j and L_j.

The principal's choices are subject to the participation of an agent. An agent becomes an owner with $1-\phi$ share of ownership, as long as its expected utility is greater or equal to an exogenous level of utility given by the outside option (δ). In addition, a lump-sum transfer (τ) can be specified in a contract, and be paid from an agent or from a principal in the form of royalties. This upfront payment ensures that a partnership is in place to guarantee the minimum payoff to an agent. The contracted values of K_j, L_j, ϕ and τ are observable and enforceable.

2. Given the physical investments at a jointly-owned enterprise, a principal and an agent act non-cooperatively, and simultaneously incur efforts for product processing (e_p^J, and e_a^J). The efforts cannot be written in a contract. Then the efforts are not observable and not enforceable.

A decision by a principal in the first stage takes into account what an agent chooses in the second stage. Therefore, we solve the solutions backward. We show the stages and decisions above in the following equations:

- *Stage 2*: A principal chooses the effort (e_p^J) and an agent chooses the effort (e_a^J) simultaneously, given y_j, c_j, and τ chosen in the first stage. p_j is the expected sales price defined by the expected final production of $y_j\sigma_j$, where $\sigma_j = E[Pr(Yield_j)] = [\phi e_p^J + (1-\phi)\bar{\theta}e_a^J](1-\phi\lambda)$. They decide e_p or e_a, taking into account how σ_j and p_j are affected by their choice of efforts and how σ_j and p_j change their expected utilities. Therefore, p_j is not exogenous in Stage 2, but is endogenously defined as players choose efforts. (We suppress the superscript of J in e_p, e_a hereafter in this section.)

$$
\begin{aligned}
\max_{e_a} E[U_a^J] &= (1-\phi)\left\{p_j[\phi e_p + (1-\phi)\bar{\theta}e_a](1-\phi\lambda) - c_j\right\} y_j(1-e_a) - \tau \\
&= (1-\phi)\left[(\frac{A}{y_j\sigma_j})^{1-\alpha}\sigma_j - c_j\right] y_j(1-e_a) - \tau \\
&= (1-\phi)[A^{1-\alpha}y^{\alpha}\sigma^{\alpha} - (rK+wL)](1-e_p) - \tau \qquad (2.18) \\
\max_{e_p} E[U_p] &= \phi\left\{p_j[\phi e_p + (1-\phi)\bar{\theta}e_a^J](1-\phi\lambda) - c_j\right\} y_j(1-e_p) + \tau \\
&= \phi\left[(\frac{A}{y_j\sigma_j})^{1-\alpha}\sigma_j - c_j\right] y_j(1-e_p) + \tau \\
&= \phi[A^{1-\alpha}y^{\alpha}\sigma^{\alpha} - (rK+wL)](1-e_a) - \tau \qquad (2.19)
\end{aligned}
$$

- *Stage 1*: A principal chooses its ownership share (ϕ_i), investments of capital and labor (K_j, L_j), and upfront payment, given an agent's participation.

$$\begin{aligned} \max_{\phi, K_j, L_j, \tau} \; E[U_p^J] &= \phi \left\{ p_j[\phi e_p + (1-\phi)\bar{\theta} e_a](1-\phi\lambda) - c_j \right\} y_j(1-e_p) + \tau \\ \text{s.t. } E[U_a^J] &\geq \delta, \text{ and } e_a^*, \, e_p^* \text{ from } \textit{Stage 2} \end{aligned} \tag{2.20}$$

First, we solve efforts by a principal and an agent in equation (2.18) and (2.19) , for *Stage 2*. We first solve the best responding level of efforts. Both parties take y_j, c_j (where $c_j y_j = rK + wL$)as exogenous, since these are defined by K_j and L_j in *Stage 1*.[12]

The first order conditions for choice of efforts are;

$$\begin{aligned} \frac{\partial E[U_a]}{\partial e_a} &= \frac{\partial m}{\partial e_a}(1-e_a) - m = 0 \\ &\Leftrightarrow \; A^{1-\alpha} y^\alpha \alpha \sigma^{\alpha-1}[(1-\phi)\bar{\theta}(1-\phi\lambda)](1-e_a) - A^{1-\alpha} y^\alpha \sigma^\alpha + (rK+wL) = 0 \\ &= A^{1-\alpha} y^\alpha \sigma^{\alpha-1}[\sigma - \alpha(1-\phi)\bar{\theta}(1-\phi\lambda)(1-e_a)] = rK + wL \end{aligned} \tag{2.21}$$

and

$$\begin{aligned} \frac{\partial E[U_p]}{\partial e_p} &= \frac{\partial m}{\partial e_p}(1-e_p) - m = 0 \\ &\Leftrightarrow \; A^{1-\alpha} y^\alpha \alpha \sigma^{\alpha-1}[\phi(1-\phi\lambda)](1-e_p) - A^{1-\alpha} y^\alpha \sigma^\alpha + (rK+wL) = 0 \\ &= A^{1-\alpha} y^\alpha \sigma^{\alpha-1}[\sigma - \alpha\phi(1-\phi\lambda)(1-e_p)] = rK + wL \end{aligned} \tag{2.22}$$

where

$$\begin{aligned} m &= A^{1-\alpha} y^\alpha \sigma^\alpha - (rK + wL) \text{ , and} \\ \sigma &= [\phi e_p + (1-\phi)\bar{\theta} e_a](1-\phi\lambda) \end{aligned}$$

From the two conditions (2.21), (2.22) above, the equilibrium levels of efforts have the following relation:

$$\begin{aligned} \phi(1-e_p^*) &= (1-\phi)\bar{\theta}(1-e_a^*) \\ \Leftrightarrow e_p^* &= 1 - \frac{(1-e_a^*)(1-\phi)\bar{\theta}}{\phi} \\ \Leftrightarrow e_a^* &= 1 - \frac{(1-e_p^*)\phi}{(1-\phi)\bar{\theta}} \end{aligned} \tag{2.23}$$

[12]Here, the expected sales price p_j is defined by the expected value of ability, $\bar{\theta}$. The actual sales price depends on the realized ability, θ_i.

We substitute e_a^* in (2.23) into (2.22) to rewrite the condition for the equilibrium choice of e_p^*, the effort chosen by the principal.

$$\begin{aligned}
(2.22) \Leftrightarrow A^{1-\alpha}y^{\alpha}\sigma^{\alpha-1}[\sigma-\alpha\phi(1-\phi\lambda)(1-e_p^*)] &= rK+wL=c_jy_j \\
\left[\phi e_p^*+(1-\phi)\bar{\theta}e_a^*\right]^{\alpha-1}\left[\phi e_p^*+(1-\phi)\bar{\theta}e_a^*-\alpha\phi(1-e_p^*)\right] &= c_j(\frac{y_j}{A})^{1-\alpha}\left[1-\phi\lambda\right]^{-\alpha} \\
\left[2\phi e_p^*+\bar{\theta}-(1+\bar{\theta})\phi\right]^{\alpha-1}\left[(2+\alpha)\phi e_p^*+\bar{\theta}-(1+\bar{\theta}+\alpha)\phi\right] &= c_j(\frac{y_j}{A})^{1-\alpha}\left[1-\phi\lambda\right]^{-\alpha}
\end{aligned} \tag{2.24}$$

The equation (2.23) is given by the Nash equilibrium level of efforts of the both parties. It shows that their efforts are in strategic compliments since the additional effort by one party enhances the effort of the other party. This condition solves out the choice of e_p^* (or e_p^*) as a function of factors defined in the first stage (K_j, L_j, ϕ) and those defined exogenously $(\bar{\theta}, \lambda, \alpha, A)$.

This means that we can solve the principal's choice of effort e_p^* along with his decisions on investments and ownership, K_j, L_j, ϕ. We will solve the closed-form solution of e_p^* then.

Next, we solve the choice of investment and ownership by a principal in equation (2.20) in *Stage 1*, taking into account the expected efforts (e_p^*, e_a^*) and expected yield (σ_j^*). A risk-neutral principal seeks to maximize the expected payoff computed by the expected final production $y_j\sigma_j^*$ and the expected sales price of $p_j = (\frac{A}{y_j\sigma_j^*})^{1-\alpha}$

$$\begin{aligned}
\max_{\phi,K_j,L_j,\tau} E[U_p^J] &= \phi\left[\left(\frac{A}{y_j\sigma_j^*}\right)^{1-\alpha}\sigma_j^*-c_j\right]y_j(1-e_p^*)+\tau \\
\text{s.t. } E[U_a^J] &= (1-\phi)\left[\left(\frac{A}{y_j\sigma_j^*}\right)^{1-\alpha}\sigma_j^*-c_j\right]y_j(1-e_a^*)-\tau \\
&\geq \delta
\end{aligned} \tag{2.25}$$

We here include the participation constraint of an agent. When the principal chooses its optimal ϕ^*, the agent expects $E[U_a^J(\phi^*)]$ before the agreement of the participation. The agent accepts the offer if this utility is at least equal to what it expects to get from the outside option, δ, and declines the offer if otherwise. At the same time, the principal can also bargain for a lump-sum transfer to reallocate the utility of an agent equal to δ. Therefore, there are two possibilities. One is the case where the expected utility is lower than δ. The other is the case where the utility is at least equal to δ. We then denote V_p^J as a principal's expected utility after a transfer.

- *Case 1* : $E[U_a^J(\phi^*)] < \delta$

  If $E[U_a^J(\phi^*)] < \delta$, the agent does not accept the offer of joint-ownership unless he/she obtains a lump-sum transfer from the principal, $\delta - E[U_a^J(\phi^*)] > 0$, to compensate the expected loss. The principal commits to the deal as long as his total expected payoff is greater than or equal to what he expects from other organizational forms.

$$V_p^J = E[U_p^J(\phi^*)] - (\delta - E[U_a^J(\phi^*)]) \geq \max\left\{E[U_p^I], E[U_p^O]\right\}$$

- *Case 2* : $E[U_a^J(\phi^*)] \geq \delta$

  If $E[U_a^J(\phi^*)] \geq \delta$, the agent is better off than or at least equal to what it expects from the outside option. Then the principal asks to receive a lump-sum transfer, $E[U_a^J(\phi^*)] - \delta \geq 0$, from the agent to offset the surplus. The agent accepts the deal if the expected payoff after the transfer is kept equal to δ. The principal selects this organizational form as long as the total expected payoff is greater than or equal to what it expects from other organizational forms.

$$V_p^J = E[U_p^J(\phi^*)] + (E[U_a^J(\phi^*)] - \delta) \geq \max\left\{E[U_p^I], E[U_p^O]\right\}$$

Therefore, in either case, the expected utility of the principal if it chooses joint-ownership is $V_p^J = E[U_p^J(\phi)] + E[U_a^J(\phi)] - \delta$. We rewrite the utility maximization problem in (2.25). The principal solves the optimization problem of V_p^J with respect to K_j, L_j, and ϕ. We substitute $c_j = \frac{rK_j + wL_j}{y_j}$ (unit cost for planned volume of production), and $p_j = (\frac{A}{y_j\sigma_j^*})^{1-\alpha}$ (expected sales price). We also substitute e_a^* in (2.23) into (2.25). This is to take into account the Nash equilibrium choice of e_a^* as a function of e_p^*.

$$\begin{aligned}
\max_{\phi, K_j, L_j} \; V_p^J &= E[U_p^J(\phi)] + E[U_a^J(\phi)] - \delta \qquad (2.26)\\
&= [(\frac{A}{y_j\sigma_j^*})^{1-\alpha}\sigma_j^* - c_j]y_j[(1-e_p^*)\phi + (1-e_a^*)(1-\phi)] - \delta \\
&= [(\frac{A}{y_j\sigma_j^*})^{1-\alpha}\sigma_j^* - c_j]y_j(1+\frac{1}{\bar{\theta}})(1-e_p^*)\phi - \delta \\
\text{s.t. } V_a^J &= \delta \geq 0
\end{aligned}$$

Using the solution of e_p^* in (2.24) and the value of σ_j^* in the second stage, the optimization in (2.26) is further shown as the utility maximization problem with respect to ϕ, K_j, L_j in the following manner.

$$
\begin{aligned}
\max_{\phi,K_j,L_j} V_p^J &= (1+\frac{1}{\bar{\theta}})[(\frac{A}{y_j\sigma_j^*})^{1-\alpha}\sigma_j^* - c_j]y_j(1-e_p^*)\phi - \delta \\
\text{s.t. } V_a^J &= \delta \geq 0 \\
c_j(\tfrac{y_j}{A})^{1-\alpha}\left[1-\phi\lambda\right]^{-\alpha} &= \left[2\phi e_p^* + \bar{\theta} - (1+\bar{\theta})\phi\right]^{\alpha-1}\left[(2+\alpha)\phi e_p^* + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi\right] \\
\sigma_j^* &= \left[2\phi e_p^* + \bar{\theta} - (1+\bar{\theta})\phi\right]\left[1-\phi\lambda\right] \\
y_j &= (\frac{K_j}{\beta})^{\beta}(\frac{L_j}{1-\beta})^{(1-\beta)}
\end{aligned}
$$

Then, we define the first order conditions of each variable. (We suppress the asterisk for e_p^* and σ_j^* to simplify). Here, we introduce the notation of $q(K, L, \phi, e_p^*)$ for the expected profit.

$$
\begin{aligned}
q &= [(\frac{A}{y_j\sigma_j})^{1-\alpha}\sigma_j - c_j]y_j \\
&= A^{1-\alpha}y_j^{\alpha}\sigma_j^{\alpha} - (rK + wL) \\
&= A^{1-\alpha}y_j^{\alpha}\left[2\phi e_p + \bar{\theta} - (1+\bar{\theta})\phi\right]^{\alpha}\left[1-\phi\lambda\right]^{\alpha} - (rK + wL) \\
&= A^{1-\alpha}(\tfrac{K_j}{\beta})^{\alpha\beta}(\tfrac{L_j}{1-\beta})^{\alpha(1-\beta)}\left[2\phi e_p + \bar{\theta} - (1+\bar{\theta})\phi\right]^{\alpha}\left[1-\phi\lambda\right]^{\alpha} - (rK + wL)
\end{aligned}
$$

Then we rewrite $V_p^J(K, L, \phi, e_p^*)$ using q. We also introduce a function F_0 to show the condition for the equilibrium level of effort, $e_p^*(K, L, \phi)$, set in the second stage from (2.24). $F_0(e_p) = 0$ is satisfied for e_p^*.

$$
\begin{aligned}
V_p^J &= (1+\frac{1}{\bar{\theta}})q(1-e_p)\phi - \delta \\
(2.24) &\Leftrightarrow F_0(e_p^*) = 0 \\
&= \left[2\phi e_p^* + \bar{\theta} - (1+\bar{\theta})\phi\right]^{\alpha-1}\left[(2+\alpha)\phi e_p^* + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi\right] - c_j(\tfrac{y_j}{A})^{1-\alpha}\left[1-\phi\lambda\right]^{-\alpha}
\end{aligned}
$$

The first order conditions are:

$$
\begin{aligned}
\frac{dV_p^J}{dK_j} &= \left[\frac{dq}{dK} + \frac{dq}{de_p}\cdot\frac{de_p}{dK}\right](1-e_p) - q\frac{de_p}{dK} = 0 \qquad (2.27) \\
&= \left[\tfrac{\alpha\beta A^{1-\alpha}y^{\alpha}\sigma^{\alpha}}{K} - r + 2\alpha\sigma^{\alpha-1}\phi(1-\phi\lambda)A^{1-\alpha}y^{\alpha}\tfrac{de_p}{dK}\right](1-e_p) - q\tfrac{de_p}{dK} = 0 \\
\frac{dV_p^J}{dL_j} &= \left[\frac{dq}{dL} + \frac{dq}{de_p}\cdot\frac{de_p}{dL}\right](1-e_p) - q\frac{de_p}{dL} = 0 \qquad (2.28) \\
&= \left[\tfrac{\alpha(1-\beta)A^{1-\alpha}y^{\alpha}\sigma^{\alpha}}{L} - w + 2\alpha\sigma^{\alpha-1}\phi(1-\phi\lambda)A^{1-\alpha}y^{\alpha}\tfrac{de_p}{dL}\right](1-e_p) - q\tfrac{de_p}{dL} = 0 \\
\frac{dV_p^J}{d\phi} &= \left[\frac{dq}{d\phi} + \frac{dq}{de_p}\cdot\frac{de_p}{d\phi}\right](1-e_p)\phi + q(1-e_p) - q\phi\frac{de_p}{d\phi} = 0 \qquad (2.29)
\end{aligned}
$$

The change in the value of e_p^* in the second stage with respect to the change of K, L, ϕ is computed by (2.24); $\frac{de_p}{dK} = \frac{-\partial F_0/\partial K}{\partial F_0/\partial e_p}$, $\frac{de_p}{dL} = \frac{-\partial F_0/\partial L}{\partial F_0/\partial e_p}$, and $\frac{de_p}{d\phi} = \frac{-\partial F_0/\partial \phi}{\partial F_0/\partial e_p}$.[13] The first order conditions of K_j in (2.27) and L_j in (2.28) show the following relation.

$$
\begin{aligned}
(2.27) \quad &\Leftrightarrow \quad \frac{dV_p^J}{dK_j} \\
&= \quad \left[\frac{dq}{dK} + \frac{dq}{de_p}\cdot\frac{de_p}{dK}\right](1-e_p) - q\frac{de_p}{dK} = 0 \qquad (2.30) \\
&= \quad \left[\frac{dq}{dK} - \frac{dq}{de_p}\cdot\frac{\partial F/\partial K}{\partial F/\partial e_p}\right](1-e_p) + q\frac{\partial F/\partial K}{\partial F/\partial e_p} = 0 \\
&\Leftrightarrow \quad \left[\frac{\partial F}{\partial e_p}\frac{dq}{dK} - \frac{dq}{de_p}\cdot\frac{\partial F}{\partial K}\right](1-e_p) + q\frac{\partial F}{\partial K} = 0 \text{ for } \partial F/\partial e_p \neq 0 \\
&= \quad \left[\frac{\partial F}{\partial e_p}\left(\frac{\alpha\beta A^{1-\alpha}y^\alpha\sigma^\alpha}{K} - r\right) - 2\phi(1-\phi\lambda)A^{1-\alpha}y^\alpha\alpha\sigma^{\alpha-1}\frac{\partial F}{\partial K}\right](1-e_p) + q\frac{\partial F}{\partial K} = 0 \\
&= \quad \frac{\partial F}{\partial e_p}\left(\frac{\alpha\beta A^{1-\alpha}y^\alpha\sigma^\alpha}{K} - r\right)(1-e_p) = \left[2\phi(1-\phi\lambda)A^{1-\alpha}y^\alpha\alpha\sigma^{\alpha-1}(1-e_p) - q\right]\frac{\partial F}{\partial K} \\
&\Leftrightarrow \quad \frac{\partial F}{\partial e_p}\left(\frac{\alpha\beta A^{1-\alpha}y^\alpha\sigma^\alpha}{K} - r\right) = \left[2\phi(1-\phi\lambda)A^{1-\alpha}y^\alpha\alpha\sigma^{\alpha-1} - \frac{q}{1-e_p}\right]\frac{\partial F}{\partial K} \\
&\Leftrightarrow \quad \frac{\partial F}{\partial e_p}\left(\frac{\alpha\beta A^{1-\alpha}y^\alpha\sigma^\alpha}{K} - r\right) = -\left[\frac{2\phi\alpha\sigma^{\alpha-1}}{(1-\phi\lambda)^{\alpha-1}} - \frac{qy^{-\alpha}A^{\alpha-1}(1-\phi\lambda)^{-\alpha}}{1-e_p}\right]\frac{rK(1-\alpha\beta)-\alpha\beta wL}{K}
\end{aligned}
$$

[13] Near the solutions that satisfy $F_0 = 0$, we have the chain rule for obtaining total derivatives.

$$
\begin{aligned}
\frac{\partial F_0}{\partial x}\cdot\frac{dx}{dx} + \frac{\partial F_0}{\partial e}\cdot\frac{de}{dx} &= 0 \\
\frac{\partial F_0}{\partial e}\cdot\frac{de}{dx} &= -\frac{\partial F_0}{\partial x} \text{ where } x = K, L, \phi
\end{aligned}
$$

The first order condition for L is computed in the similar fashion. The terms $s = \frac{\partial F}{\partial e_p}$, $\frac{dq}{de_p}$ are common for K, and L.

$$
\begin{aligned}
(2.27) \quad &\Leftrightarrow \quad \frac{\partial F_0}{\partial e_p}\left(\frac{\alpha\beta A^{1-\alpha} y^{\alpha}\sigma^{\alpha}}{L} - r\right) = z\left(\frac{rK - \alpha\beta(rK + wL)}{K}\right) \\
&\Leftrightarrow \quad \frac{s}{z}[\alpha\beta A^{1-\alpha} y^{\alpha}\sigma^{\alpha}] = (1 + \frac{s}{z})rK - \alpha\beta(rK + wL) \qquad (2.31) \\
(2.28) \quad &\Leftrightarrow \quad \frac{\partial F_0}{\partial e_p}\left(\frac{\alpha(1-\beta) A^{1-\alpha} y^{\alpha}\sigma^{\alpha}}{L} - w\right) = z\left(\frac{wL - \alpha(1-\beta)(rK + wL)}{L}\right) \\
&\Leftrightarrow \quad \frac{s}{z}[\alpha(1-\beta) A^{1-\alpha} y^{\alpha}\sigma^{\alpha}] = (1 + \frac{s}{z})wL - \alpha(1-\beta)(rK + wL) \qquad (2.32)
\end{aligned}
$$

where

$$
\begin{aligned}
s &= \frac{\partial F_0}{\partial e_p} \\
z &= -\left[2\alpha\phi[2\phi e_p + \bar{\theta} - (1+\bar{\theta})\phi]^{\alpha-1} - \frac{q y^{-\alpha}(1-\phi\lambda)^{-\alpha} A^{\alpha-1}}{1 - e_p}\right] \\
\frac{\partial F_0}{\partial K} &= -\frac{rK - \alpha\beta(rK + wL)}{K} y^{-\alpha}(1-\phi\lambda)^{-\alpha} A^{\alpha-1} \\
\frac{\partial F_0}{\partial L} &= -\frac{wL - \alpha(1-\beta)(rK + wL)}{L} y^{-\alpha}(1-\phi\lambda)^{-\alpha} A^{\alpha-1}
\end{aligned}
$$

When we add (2.27) $\times K$ and (2.28) $\times L$, we have the following equation.

$$
\begin{aligned}
\frac{s}{z}[\alpha A^{1-\alpha} y^{\alpha}\sigma^{\alpha} - (rK + wL)] &= (1-\alpha)(rK + wL) \\
\alpha A^{1-\alpha} y^{\alpha}\sigma^{\alpha} &= \frac{z}{s}(1 + \frac{s}{z} - \alpha)(rK + wL) \\
&= [\frac{z}{s}(1-\alpha) + 1](rK + wL) \qquad (2.33)
\end{aligned}
$$

We plug (2.33) into (2.27) or (2.28).

$$
\begin{aligned}
(2.27) \quad &\Rightarrow \quad \frac{s}{z}[\beta(1 + \frac{s}{z} - \alpha)\frac{z}{s}(rK + wL)] = (1 + \frac{s}{z})rK - \alpha\beta(rK + wL) \\
&\Leftrightarrow \quad \beta(1 + \frac{s}{z})(rK + wL) = (1 + \frac{s}{z})rK \\
&\Leftrightarrow \quad (1-\beta)rK = \beta wL
\end{aligned}
$$

We again show (2.27) as a function of K by substituting $L = \frac{(1-\beta)rK}{\beta w}$. The optimization problems with respect to K_j in (2.27) and L_j in (2.28) satisfy the following conditions.

$$
\begin{aligned}
K^{\alpha-1} &= \frac{[\frac{z}{s}(1-\alpha)+1]r}{[\alpha\beta^{1-\alpha}A^{1-\alpha}(\frac{r}{w})^{\alpha(1-\beta)}\sigma^{\alpha}]} \\
\Leftrightarrow K &= \left[\frac{z}{s}(1-\alpha)+1\right]^{\frac{-1}{1-\alpha}} A\beta(\frac{\alpha\sigma^{\alpha}}{r})^{\frac{1}{1-\alpha}}(\frac{r}{w})^{\frac{\alpha(1-\beta)}{1-\alpha}} \qquad (2.34) \\
\Leftrightarrow L &= \left[\frac{z}{s}(1-\alpha)+1\right]^{\frac{-1}{1-\alpha}} A(1-\beta)(\frac{\alpha\sigma^{\alpha}}{w})^{\frac{1}{1-\alpha}}(\frac{r}{w})^{\frac{-\alpha\beta}{1-\alpha}} \qquad (2.35)
\end{aligned}
$$

Equations (2.34) and (2.35) show the optimal K_j^* and L_j^*. We also show y_j^* (planned production volume from the optimal choice of K_j^* and L_j^*) and c_j^* (unit cost: the total cost divided by y^*) as a function of σ_j.

$$
\begin{aligned}
y_j^* &= \chi A(\alpha\sigma^{\alpha})^{\frac{1}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-1}{1-\alpha}} \\
rK_j^* + wL_j^* &= \chi A(\alpha\sigma^{\alpha})^{\frac{1}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}} \\
c_j^* &= \frac{rK_j^* + wL_j^*}{y_j^*} = r^{\beta}w^{1-\beta} \text{ ,where} \\
\chi &= \left[\frac{z}{s}(1-\alpha)+1\right]^{\frac{-1}{1-\alpha}}
\end{aligned}
$$

We next takes into account the first order condition of ϕ. The equation (2.29) shows the following relation using $\frac{de_p}{d\phi} = \frac{-\partial F_0/\partial\phi}{\partial F_0/\partial e_p}$.

$$
\begin{aligned}
\frac{dV_p^J}{d\phi} = &\quad \left[\frac{dq}{d\phi} + \frac{dq}{de_p}\cdot\frac{de_p}{d\phi}\right](1-e_p)\phi + q(1-e_p) - q\phi\frac{de_p}{d\phi} = 0 \\
\Leftrightarrow &\quad \frac{\partial F_0}{\partial e_p}\left[\frac{dq}{d\phi}\phi + q\right](1-e_p) + \frac{\partial F_0}{\partial\phi}\left[q - \frac{dq}{de_p}(1-e_p)\right]\phi = 0 \qquad (2.36)
\end{aligned}
$$

To solve, we apply K_j^* and L_j^* into the terms used above: q, $\frac{dq}{d\phi}$, and $\frac{dq}{de_p}$.

$$
\begin{aligned}
q &= A^{1-\alpha}y^{\alpha}\sigma^{\alpha} - (rK + wL) \qquad (2.37) \\
&= \chi^{\alpha}A(\alpha\sigma)^{\frac{\alpha}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}} - \chi A(\alpha\sigma^{\alpha})^{\frac{1}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}} \\
&= A(\alpha\sigma)^{\frac{\alpha}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}}\chi^{\alpha}(1-\alpha\chi^{1-\alpha}) \\
\frac{dq}{d\phi} &= A^{1-\alpha}y^{\alpha}\alpha\sigma^{\alpha-1}[(1-2\phi\lambda)(2e_p - 1 - \bar{\theta})] \qquad (2.38) \\
&= A\alpha^{\frac{1}{1-\alpha}}\sigma^{\frac{2\alpha-1}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}}\chi^{\alpha}[(1-2\phi\lambda)(2e_p - 1 - \bar{\theta})] \\
\frac{dq}{de_p} &= A^{1-\alpha}y^{\alpha}\alpha\sigma^{\alpha-1}[2\phi(1-\phi\lambda)] \qquad (2.39) \\
&= 2A\alpha^{\frac{1}{1-\alpha}}\sigma^{\frac{2\alpha-1}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}}\chi^{\alpha}\phi(1-\phi\lambda)
\end{aligned}
$$

We also substitute K_j^* and L_j^* into F_0, the condition of e_p in the second stage (2.24), as well as $\frac{\partial F_0}{\partial e_p}$, and $\frac{\partial F_0}{\partial \phi}$.

$$
\begin{aligned}
F_0 &= \left[2\phi e_p + \bar{\theta} - (1+\bar{\theta})\phi\right]^{\alpha-1}\left[(2+\alpha)\phi e_p + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi\right] - c_j(\tfrac{y_j}{A})^{1-\alpha}\left[1-\phi\lambda\right]^{-\alpha} \\
&= \rho^{\alpha-1}\left[(2+\alpha)\phi e_p + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi\right] - \alpha\rho^{\alpha}\chi^{1-\alpha} \qquad (2.40) \\
\frac{\partial F_0}{\partial \phi} &= \rho^{\alpha-2}\left[(\alpha-1)(2e_p - 1 - \bar{\theta})\upsilon + \rho\{(2+\alpha)e_p - (1+\bar{\theta}+\alpha)\}\right] - \alpha\lambda c_j(\tfrac{y_j}{A})^{1-\alpha}\left[1-\phi\lambda\right]^{-\alpha-1} \\
&= \rho^{\alpha-2}\left[(\alpha-1)(2e_p - 1 - \bar{\theta})\upsilon + \rho\{(2+\alpha)e_p - (1+\bar{\theta}+\alpha)\}\right] - \alpha^2\lambda\rho^{\alpha}\chi^{1-\alpha}[1-\phi\lambda]^{-1} \\
&= \rho^{\alpha-2}\{\xi - \alpha^2\rho^2\lambda\chi^{1-\alpha}[1-\phi\lambda]^{-1}\} \qquad (2.41) \\
\frac{\partial F_0}{\partial e_p} &= \phi\rho^{\alpha-2}[2\alpha(2+\alpha)\phi e_p + 3\alpha\bar{\theta} - \{2\alpha^2 + \alpha(1+3\bar{\theta})\}\phi] \\
&= \phi\rho^{\alpha-2}\psi
\end{aligned}
$$

where

$$
\begin{aligned}
\rho &= [2\phi e_p + \bar{\theta} - (1+\bar{\theta})\phi] = \sigma/(1-\phi\lambda) \\
\upsilon &= \left[(2+\alpha)\phi e_p + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi\right] \\
\xi &= \left[(\alpha-1)(2e_p - 1 - \bar{\theta})\upsilon + \rho\{(2+\alpha)e_p - (1+\bar{\theta}+\alpha)\}\right] \\
\psi &= [2\alpha(2+\alpha)\phi e_p + 3\alpha\bar{\theta} - \{2\alpha^2 + \alpha(1+3\bar{\theta})\}\phi]
\end{aligned}
$$

Equation (2.36) for $\frac{\partial V_p^J}{\partial \phi} = 0$ is therefore rewritten as follows as a function of $\alpha, \bar{\theta}, \lambda, e_p$:[14]

$$
\begin{aligned}
(2.36) \;\Leftrightarrow\; & \psi[\alpha(1-2\phi\lambda)(2e_p - 1 - \bar{\theta}) + \sigma(1-\alpha\chi^{1-\alpha})](1-e_p) \\
& + \{\xi - \alpha^2\rho^2\lambda\chi^{1-\alpha}[1-\phi\lambda]^{-1}\}[\sigma(1-\alpha\chi^{1-\alpha}) - 2\alpha\phi(1-\phi\lambda)(1-e_p)] \\
&= 0 \text{ , where} \qquad (2.42) \\
\chi^{1-\alpha} &= [\frac{z}{s}(1-\alpha) + 1]^{-1} \\
&= \left[\frac{\rho^{\alpha-1}\{2\alpha\phi - \rho(1-\alpha\chi^{1-\alpha})\}}{\rho^{\alpha-2}\phi\psi}(1-\alpha) + 1\right]^{-1} \\
&= \left[\frac{\rho\{2\alpha\phi - \rho(1-\alpha\chi^{1-\alpha})\}(1-\alpha) + \phi\psi}{\phi\psi}\right]^{-1} \qquad (2.43)
\end{aligned}
$$

(2.42) is a function of $\alpha, \bar{\theta}, \lambda$, and e_p. We solve the choice of effort by the principal (e_p) in the second stage from F_0, using c_j^* and y_j^*.

[14] There are common multipliers for two brackets in (2.36). These non-zero terms are omitted to simplify. $(\rho^2 A\alpha^{\frac{\alpha}{1-\alpha}}\sigma^{\frac{2\alpha-1}{1-\alpha}}(r^{\beta}w^{1-\beta})^{\frac{-\alpha}{1-\alpha}}\chi^{\alpha}\phi.)$

$$
\begin{aligned}
F_0 \quad &\Leftrightarrow \quad \rho^{\alpha-1}\left[(2+\alpha)\phi e_p + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi\right] - \alpha\rho^{\alpha}\chi^{1-\alpha} = 0 \\
&\Leftrightarrow \quad (2+\alpha)\phi e_p + \bar{\theta} - (1+\bar{\theta}+\alpha)\phi - \alpha\chi^{1-\alpha}[2\phi e_p + \bar{\theta} - (1+\bar{\theta})\phi] = 0 \\
&\Leftrightarrow \quad e_p = \frac{\alpha\chi^{1-\alpha}[\bar{\theta} - (1+\bar{\theta})\phi] - \bar{\theta} + (1+\bar{\theta}+\alpha)\phi}{(2+\alpha-2\alpha\chi^{1-\alpha})\phi}
\end{aligned} \tag{2.44}
$$

By substituting $\chi^{1-\alpha}, \rho, \psi$, and υ into (2.44), we solve e_p^* as a function of α, ϕ, and $\bar{\theta}$. (It is solvable with a closed-form.)

Then we plug e_p^* into (2.42) and solve ϕ^*, the choice of ownership percentage in the first stage. The optimal choice of ϕ^* is shown as a function of α (the inverse of an industry-level markup), $\bar{\theta}$ (the expected absorptive capacity of the local industry) and λ (the required level of local knowhow).

One of our interests is how the ownership percentage (by the principal) responds to $\bar{\theta}$ (the expected level of local technological absorptive capacity) and λ (required level of managerial local knowledge). We might also need to check how the market structure of an industry affect the results.

The graphs below show the simulation (examples) showing the relationship between λ and ϕ (in Figure 2.2), and that between $\bar{\theta}$ and ϕ (in Figure 2.3). We shift λ or $\bar{\theta}$ in X-axis, and illustrate the optimal choice of ownership by the principal (ϕ) in Y-axis.

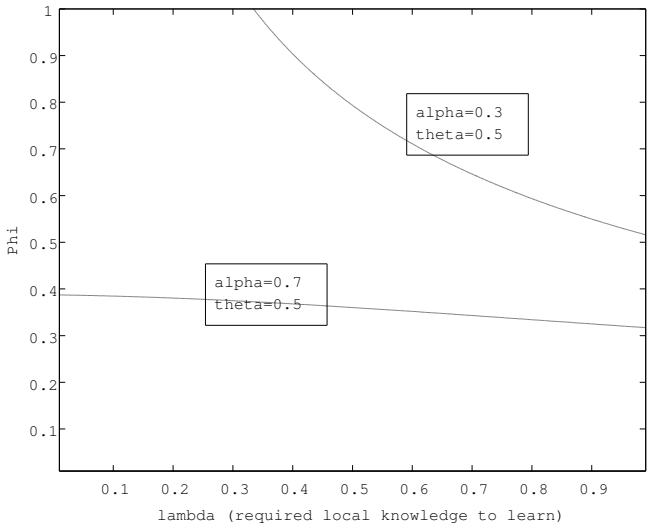


Figure 2.2: Ownership and the Required Local Knowledge (λ) with Changes in α

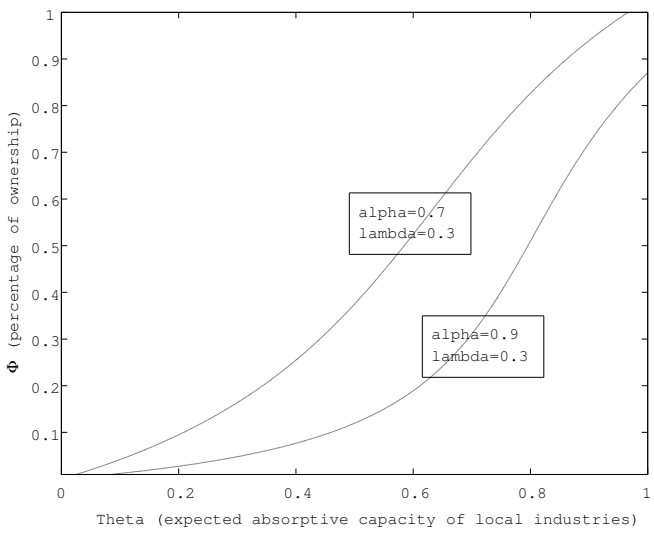


Figure 2.3: Ownership and the Expected Local Ability ($\bar{\theta}$) with Changes in α

In Figure 2.2, we set $\bar{\theta} = 1/2$, where λ takes the value of $0 < \lambda < 1$. α takes values within $0 < \alpha < 1$ (As α is closer to 1, final goods market is closer to perfect competition.) Figure 2.2 shows that the optimal ownership declines as the principal needs to acquire local knowledge more. In addition, the optimal ownership percentage changes more elastically when the principal benefits a higher market power (i.e. $\alpha = 0.3$, compared to $\alpha = 0.7$). This is because, as a markup of final goods gets higher, a marginal change in ownership percentage makes a higher difference on its expected profits.

In Figure 2.3, we set $\lambda = 0.3$, where $\bar{\theta}$ takes values within $0 < \bar{\theta} < 1$. Again α take the values within $0 < \alpha < 1$. Figure 2.3 shows that the ownership increases as the expected level of local technology becomes higher. When local producers expect a higher technological ability of their side, they will make a smaller amount of effort. MNEs, taking into account such behavior, try to have a higher ownership percentage to maintain the expected yield. Similar to the case for λ in Figure 2.2, when the principal benefits a higher market power, he tries to hold a higher percentage of ownership.

2.3.3 Outsourcing

There are two decision makers. First, a principal chooses a wholesale price $\bar{p}$ and specifies the amount of capital investment K_o. It is possible to enforce K_o but not the actual volume of production, since an agent's ability is not certain at the time of contract. Therefore, a

principal indirectly specifies the volume it would like to purchase through the contract of capital investment. A local agent responds to the order by hiring workers L_o and choosing effort e_a. We assume the timing of events as follows.

1. A principal chooses $\bar{p}$ (a fixed unit price to buy from a local producer) when it delegates production processes to an agent. For each successfully produced product, a principal agrees to pay $\bar{p}$ to an agent. At an outsourcing contract, a principal specifies the investment of capital that an agent should provide. The contracted value is observable and enforceable by the principal. The choice of K_o and $\bar{p}$ by a principal is subject to the participation of an agent.

2. Given an agreement of outsourcing production, an agent decides the number of workers to employ (L_o). A principal does not commit to the employment decision by an agent. Following the agreement with a principal, an agent incurs the investment in capital specified by a principal. An agent also chooses its effort in product processing. This effort is chosen to maximize the utility of the agent, and its principal cannot observe or enforce the level of effort.

We show the stages and decisions above in the following equations:

- *Stage 2*: An agent chooses an effort (e_a) and employment of labor (L_o) given the choices by a principal in *Stage 1*.

$$\begin{aligned} \max_{e_a, L_o} E[U_a^O] &= E[\pi_a^O](1 - e_a) \\ &= (\bar{p} y_o E[Pr(Yield)] - c_o y_o)(1 - e_a) \\ &= (\bar{p}\bar{\theta} e_a y_o - c_o y_o)(1 - e_a) \end{aligned} \tag{2.45}$$

- *Stage 1*: A principal specifies a unit transaction price ($\bar{p}$) and investment of capital (K_o) given the participation of an agent.

$$\begin{aligned} \max_{\bar{p}, K_o} E[U_p^O] &= E[\pi_p^O] = (p_o - \bar{p}) y_o E[Pr(Yield)] \\ &= (p_o - \bar{p}) y_o e_a \bar{\theta} \\ \text{s.t. } E[U_a^O] &\geq \delta, \text{ and } e_a^*, L_o^* \text{ from } \textit{Stage 2} \end{aligned} \tag{2.46}$$

First, we rewrite the expected utility for the agent in Equation (2.45) in *Stage 2*. We use $y_o = \left(\frac{K_o}{\beta}\right)^{\beta}\left(\frac{L_o}{1-\beta}\right)^{1-\beta} = k^{\beta}l^{1-\beta}$ for simplicity.

$$\begin{aligned}\max_{e_a,l} E[U_a^O] &= (\bar{p}\bar{\theta}e_a - c_o)y_o(1-e_a) \\ &= [\bar{p}\bar{\theta}e_a(\frac{K_o}{\beta})^{\beta}(\frac{L_o}{1-\beta})^{1-\beta} - rK_o - wL_o](1-e_a) \\ &= [\bar{p}\bar{\theta}e_a k^{\beta}l^{1-\beta} - \beta rk - (1-\beta)wl](1-e_a),\end{aligned} \tag{2.47}$$

where $k = \frac{K_o}{\beta}$ and $l = \frac{L_o}{1-\beta}$. We then solve the effort e_a and the employment of labor (l) by an agent in Equation (2.47). The first-order conditions of each variable satisfy the following equation:

$$\begin{aligned}\frac{\partial E[U_a^O]}{\partial e_a} &= 0 \\ e_a^* &= \frac{1}{2}\left[1 + \frac{\beta r}{\bar{p}\bar{\theta}}(\frac{k}{l^*})^{1-\beta} + \frac{(1-\beta)w}{\bar{p}\bar{\theta}}(\frac{k}{l^*})^{-\beta}\right] \qquad (2.48) \\ \frac{\partial E[U_a^O]}{\partial l} &= 0 \\ l^* &= \left(\frac{\bar{p}\bar{\theta}e_a^*}{w}\right)^{\frac{1}{\beta}} k \qquad (2.49)\end{aligned}$$

We combine Equations (2.48) and (2.49) and solve e_a^* and l^* as a function of k and $\bar{p}$. The equations are given as follows.[15] (We hereafter abstract the superscript * for e_a^* and l^*.)

$$\begin{aligned}F_1(e_a^*, \bar{p}) &= (1+\beta)e_a - 1 - \beta r(\bar{p}\bar{\theta})^{-\frac{1}{\beta}} w^{\frac{1-\beta}{\beta}} e_a^{\frac{\beta-1}{\beta}} = 0 \\ F_2(l^*, \bar{p}, k) &= (1+\beta)w(\frac{k}{l})^{-\beta} - \bar{p}\bar{\theta} - \beta r(\frac{k}{l})^{1-\beta} = 0\end{aligned}$$

[15] Specifically, we plug $(\frac{k}{l^*})^{-\beta} = \frac{\bar{p}\bar{\theta}e_a}{w}$ from (2.49) into (2.48).

Next, we solve the utility maximization problem of a principal in (2.46) in *Stage 1*. We rewrite the condition as follows.

$$\begin{aligned}
\max_{\bar{p},k} \; E[U_p^O] &= E[\pi_p^O] = (p_o - \bar{p}) y_o E[Pr(Yield)] \\
&= (p_o - \bar{p}) y_o e_a \bar{\theta} \\
&= [A^{1-\alpha}(k^\beta l^{1-\beta} e_a \bar{\theta})^{\alpha-1} - \bar{p}] k^\beta l^{1-\beta} e_a \bar{\theta} \\
\text{s.t. } E[U_a^O] &= [\bar{p}\bar{\theta} e_a k^\beta l^{1-\beta} - \beta r k - (1-\beta) w l](1 - e_a) \geq \delta \\
F_1(e_a^*, \bar{p}) &= (1+\beta) e_a - 1 - \beta r (\bar{p}\bar{\theta})^{-\frac{1}{\beta}} w^{\frac{1-\beta}{\beta}} e_a^{\frac{\beta-1}{\beta}} = 0 \\
F_2(l^*, \bar{p}, k) &= (1+\beta) w (\frac{k}{l})^{-\beta} - \bar{p}\bar{\theta} - \beta r (\frac{k}{l})^{1-\beta} = 0
\end{aligned}$$

where p_o shows the expected sales price; $p_o = (\frac{A}{y\sigma_o})^{1-\alpha} = (\frac{A}{y e_a \bar{\theta}})^{1-\alpha}$. To solve this problem, we set the Lagrangean as below:[16]

$$\mathfrak{L} = E[U_p^o] + \mu_0 [E[U_a^o] - \delta] + \mu_1 [F_1(e_a^*, \bar{p})] + \mu_2 [F_2(l^*, \bar{p}, k)] \tag{2.50}$$

where $E[U_a^o] - \delta = 0$ for $\mu_0 > 0$ (a binding constraint) and $E[U_a^o] - \delta > 0$ for $\mu_0 = 0$ (a non-binding constraint). In this case, we can show that the constraint is binding. If the constraint is not binding, $\tilde{y} = k^\beta l^{1-\beta} e_a \bar{\theta}$ must be set at zero. Then, there is a contradiction with our assumption of $k > 0$, $l > 0$, $e_a > 0$, and $\bar{\theta} > 0$.

Therefore, an agent is going to obtain the minimum expected utility of δ in outsourcing. An agent's choice of e_a and l is specified by a principal's choices to reach this expected utility. We then solve the following conditions. Here, we denote $\tilde{y} = y e_a \bar{\theta}$. (In general, we obtain deterministic solutions of a variable as long as we have a linear, quadratic, cubic, or quartic equation of the variable.)

[16] We can also solve this problem by substituting the choices of the second stage. For example, we use $l^* = \left(\frac{\bar{p}\bar{\theta} e_a^*}{w}\right)^{\frac{1}{\beta}} k$ in (2.49) to show $E[U_p^O]$ and $E[U_a^O]$ as a function of $k, \bar{p}, e_a^*$. Then we totally differentiate with respect to $k, \bar{p}$, taking into account their effects on the value of e_a^*.

$$\frac{d\mathfrak{L}}{dk} = \frac{\alpha A^{1-\alpha}\tilde{y}^{\alpha}-\bar{p}\tilde{y}}{k} + \mu_0(1-e_a)(\frac{\bar{p}\tilde{y}}{k}-r) - \mu_2(\frac{l}{k})^{\beta}\left[\frac{(1+\beta)w}{k}+\frac{(1-\beta)r}{l}\right] = 0 \quad (2.51)$$

$$\frac{d\mathfrak{L}}{d\bar{p}} = [\mu_0(1-e_a)-1]\tilde{y} + \mu_1\frac{(\bar{p}\bar{\theta})^{-\frac{1}{\beta}}w^{\frac{1-\beta}{\beta}}e_a^{\frac{\beta-1}{\beta}}}{\bar{p}} - \mu_2\bar{\theta} = 0 \quad (2.52)$$

$$\frac{d\mathfrak{L}}{d\mu_0} = [\bar{p}\tilde{y}-\beta rk-(1-\beta)wl](1-e_a)-\delta = 0 \quad (2.53)$$

$$\frac{d\mathfrak{L}}{d\mu_1} = (1+\beta)e_a - 1 - \beta r(\bar{p}\bar{\theta})^{-\frac{1}{\beta}}w^{\frac{1-\beta}{\beta}}e_a^{\frac{\beta-1}{\beta}} = 0 \quad (2.54)$$

$$\frac{d\mathfrak{L}}{d\mu_2} = \frac{l^{\beta}}{k^{\beta-1}}\left[\frac{(1+\beta)w}{k}+\frac{\beta r}{l}\right] - \bar{p}\bar{\theta} = 0 \quad (2.55)$$

Under the stylized assumption of $\beta = 1/3$ (for capital intensity), we have cubic equations for e_a in Equation (2.54) and l in Equation (2.55). Then, we get closed-form solutions. [17]

We then try to figure out the choice of k, $\bar{p}$ (in addition to μ_i for $i = 0, 1, 2$) applying the five first-order conditions of the Lagrangean with a simulation.

Our interests in the simulation are the marginal changes of choice variables and utilities with respect to $\bar{\theta}$. When we plug in $e_a^*(\bar{p})$, Equation (2.54) is shown as a function of $\bar{p}$. We then simulate the relation between the choice of $\bar{p}$ and $\bar{\theta}$. Similarly, when we plug in $e_a^*(\bar{p})$ and $l^*(\bar{p}, k)$, (2.53) and (2.55) are shown as the functions of $\bar{p}$ and k, where (2.53) comes from the constraint set by a principal, and (2.55) comes from the choice of an agent.[18]

We show that $\bar{p}$ (transaction price) increases with a higher expected local ability ($\bar{\theta}$). Capital investment and labor employment both increase with ($\bar{\theta}$), as investors become less worried about the waste of investments. Instead, a local agent chooses less effort, as it has a higher expected ability. The expected sales price for a final product also decreases in an expected ability, since an increase in a volume of production leads to a lower price per unit in monopolistic competition. We show some tables for the comparison of organizational forms, and we discuss the results in the next section.

---

[17] Solution for $\beta = 1/3$ is given as follows:

$$e_a^* = \left\{\frac{rw^2}{4(\bar{p}\bar{\theta})^3} + [(\frac{rw^2}{4(\bar{p}\bar{\theta})^3})^2 + (\frac{3(\bar{p}\bar{\theta})^3}{rw^2})^3]^{\frac{1}{2}}\right\}^{\frac{1}{3}} + \left\{\frac{rw^2}{4(\bar{p}\bar{\theta})^3} - [(\frac{rw^2}{4(\bar{p}\bar{\theta})^3})^2 + (\frac{3(\bar{p}\bar{\theta})^3}{rw^2})^3]^{\frac{1}{2}}\right\}^{\frac{1}{3}}$$

$$l^* = k[\left\{\frac{2w}{r} + [\frac{4w^2}{r^2} + \frac{(\bar{p}\bar{\theta})^3}{r^3}]^{\frac{1}{2}}\right\}^{\frac{1}{3}} + \left\{\frac{2w}{r} - [\frac{4w^2}{r^2} + \frac{(\bar{p}\bar{\theta})^3}{r^3}]^{\frac{1}{2}}\right\}^{\frac{1}{3}}]^{-3}$$

[18] We explain the remaining steps after we solve $\bar{p}$ and k. From Equation (2.52), we show μ_2 as a function of μ_0, μ_1. We plug $\mu_2(\mu_0, \mu_1)$ into (2.51) and solve μ_1 as a function of μ_0. We substitute this $\mu_1(\mu_0)$ into $\mu_2(\mu_0, \mu_1)$ to get $\mu_2(\mu_0)$. We plug these back into (2.52), and we show (2.52) as a function of μ_0 to solve. μ_1 and μ_2 are computable by μ_0.

2.4 Comparison of Organizational Forms

We here summarize the expected utilities of the three organizational forms chosen by a principal (a parent firm of a multinational enterprise).

A principal may fully integrate its foreign affiliate, partially integrate, or delegate its planned activity to an independent foreign firm. If a principal fully integrates its affiliate, a local firm continues its business locally and it will get a non-negative utility of δ. In the latter two organizational forms, a principal has to offer a certain amount of utility to an agent (a local firm in a foreign country) to let him/her participate at the time of contract.

In the free-entry equilibrium, an agent's expected utility is consistently set at δ in each organizational form. This is because a principal needs to guarantee an expected utility of δ at least for an agent to participate, but it does not need to guarantee more than δ. Since the same level of utility is expected for an agent in any organizational form, a risk-neutral agent has indifferent preference to the principal's choice.

In contrast, a principal's expected utility may differ. A principal chooses the organizational form with the highest expected utility. According to previous sections, a principal's utility is given in Equation (2.17), (2.26), and (2.46).

$$
\begin{aligned}
V_p^I(\lambda) &= E[U_p^I] = E[\pi_p^I](1-e_p) && (2.56)\\
&= A(1-\alpha)^2\left(\frac{r^\beta w^{1-\beta}}{\alpha}\right)^{\frac{-\alpha}{1-\alpha}}[\alpha(1-\lambda)]^{\frac{\alpha}{1-\alpha}} \\
V_p^J(\lambda,\bar{\theta}) &= E[U_p^J(\phi^*)] + E[U_a^J(\phi^*)] - \delta && (2.57)\\
&= (1+\frac{1}{\bar{\theta}})[(\frac{A}{y_j\sigma_j})^{1-\alpha}\sigma_j - c_j]y_j(1-e_p)\phi - \delta \\
&= (1+\frac{1}{\bar{\theta}})A(\alpha\sigma)^{\frac{\alpha}{1-\alpha}}(r^\beta w^{1-\beta})^{\frac{-\alpha}{1-\alpha}}\chi^\alpha(1-\alpha\chi^{1-\alpha})(1-e_p)\phi - \delta \\
V_p^O(\bar{\theta}) &= E[\pi_p^O] - \delta && (2.58)\\
&= [(\frac{A}{y_o e_a \bar{\theta}})^{1-\alpha} - \bar{p}]y_o e_a \bar{\theta}
\end{aligned}
$$

Equation (2.56), the expected utility of fully integrating an affiliate is a function of λ, a required local knowledge that a principal needs to learn. Equation (2.58), the expected utility of an outsourcing contract with a local firm is a function of $\bar{\theta}$, an observable, expected technological ability of a local industry. Equation (2.57), the expected utility of jointly operating an affiliate with a local agent is a function of both λ and $\bar{\theta}$.

λ (a required local knowledge) is an ex-ante observable variable, but the realization of θ_i (the actual absorptive capacity when a party works with a local partner) is not observable

prior to a processing activity.

There exists an unexpected outcome when a principal works with a local agent in joint-ownership or in an outsourcing contract. Therefore, a completely risk-averse investor naturally chooses full integration, and a risk-neutral investor compares the organizational forms by expected utilities. We assume the latter case here, and we compare the expected utilities for the feasible value of λ and $\bar{\theta}$.

First, the utility from joint ownership or integration is a function of the required location-specific knowledge for a principal (λ). Table 2.4 shows how the choice variables are affected by the marginal change in λ.[19] We specify other exogenous variables to compute the signs of the first and second-order derivatives: $\bar{\theta} = 1/2$, $r_p = 0.04$, $w = 5$, $\beta = 1/3$, $\alpha = 0.9$, $A = 10^7$ and $\delta = 10$. A is a constant positive term indicating the demand for industry Y as a whole. δ is a non-negative constant value that an agent obtains. $\bar{\theta} = 1/2$ is the mean value of the feasible range of θ_i: $0 < \theta_i < 1$. $r_p = 0.04$ is the borrowing interest rate for a principal. $w = 5$ shows the unit wage. $\beta = 1/3$ shows an empirically justified value for the capital intensity in production activities. The unit cost of production $c = r^{\beta} w^{1-\beta}$ of this example is 1. α shows the level of product substitutability between brands. $markup = 1/\alpha = 1/0.9 \simeq 1.1$ means that the expected sales price is 1.1 times of its marginal cost. This value is slightly higher than the value we computed (i.e. $1/\alpha = 1/0.96 \simeq 1.04$) from *Basic Survey of Japanese Business Structure and Activities*, but smaller than the value computed by Lai and Zhu (2004) for traded commodity for OECD economies (i.e. $1/\alpha = 1/0.75 \simeq 1.33$). The value of α reaches 1 when the market is perfectly competitive. In a case with joint ownership, we investigate the variables K, L, e_p, and e_a defined when the optimal ϕ^* is chosen. Using the numerical examples above, we give an analysis of the choice of investments, efforts, and ownership with respect to λ.

As summarized in Table 2.4, a higher λ leads to a lower yield in processing, which discourages the initial physical investments on K and L in both integration and joint ownership. In integration, a principal's effort does not change, since a gain from additional effort is offset by a reduction of time left.[20] In joint ownership, a higher λ leads to an increase in effort of a principal to compensate for the loss of yield from having a higher λ. An increase in λ also leads to a delegation of ownership to a local agent as a way to acquire more local knowledge.[21]

[19] Our interests here are showing the effects of exogenous variables on some choice variables. Directions of the marginal changes in the table are computed by assigning numerical values for relevant exogenous variables, and they are not necessarily the same for all the feasible choices of parameters in the model.

[20] A principal's effort is $e_p = \alpha$ as in Equation (2.15). It means that the level of effort is independent of λ. He/she takes more effort as his/her final market becomes more competitive.

		K	L	e_p	e_a	ϕ^*
λ	Joint	$\frac{dK}{d\lambda} < 0$ $\frac{d^2K}{d\lambda^2} > 0$	$\frac{dL}{d\lambda} < 0$ $\frac{d^2L}{d\lambda^2} > 0$	$\frac{de_p}{d\lambda} > 0$ $\frac{d^2e_p}{d\lambda^2} < 0$	$\frac{de_a}{d\lambda} > 0$ $\frac{d^2e_a}{d\lambda^2} < 0$	$\frac{d\phi^*}{d\lambda} < 0$ $\frac{d^2\phi^*}{d\lambda^2} > 0$
	Integration	$\frac{dK}{d\lambda} < 0$ $\frac{d^2K}{d\lambda^2} > 0$	$\frac{dL}{d\lambda} < 0$ $\frac{d^2L}{d\lambda^2} > 0$	0	n.a.	n.a.

Table 2.4: Choice Variables and their Marginal Changes with λ

We then illustrate how a change in λ affects the expected utility, through all these choices of investments (K, L), efforts (e_p, e_a), and ownership (ϕ).[22]

Figure 2.4 compares the expected utility of full integration (line 1), joint ownership (line 2), and outsourcing (line 3) using the same numerical example as 2.4. The lines 1 and 2 show a decreasing utility with respect to λ, and the threshold value where the expected utilities are equivalent depends on the level of the other parameters. We find that the marginal decline in utility with respect to λ is greater in integration than in outsourcing. This is because the loss of yield from learning local knowledge is mitigated by an agent's participation in managerial control and efforts taken by both parties.[23]

We next compare joint ownership (line 2) and outsourcing (line 3). A principal's utility is decreasing in λ in joint ownership, whereas the utility is independent of λ in outsourcing. Therefore, as the required amount of knowledge decreases, joint ownership is preferred over outsourcing.[24]

In Figure 2.4, the highest utilities of the three organizational forms across the feasible range of λ is achieved either by full integration (at the lower value of λ), or by outsourcing (at the higher value of λ). However, the threshold shifts, for example, by a higher value

[21]For joint ownership, we compute the derivatives as follows:

$$\frac{dK}{d\lambda} = \frac{\partial K}{\partial \chi} \cdot \frac{d\chi}{d\lambda} + \frac{\partial K}{\partial \sigma} \cdot \frac{d\sigma}{d\lambda} \text{ for derivatives of } K \text{ and } L, \text{ and}$$
$$\frac{de}{d\lambda} = \frac{\partial e}{\partial \phi} \cdot \frac{d\phi}{d\lambda} + \frac{\partial e}{\partial \chi} \cdot \frac{d\chi}{d\lambda} \text{ for derivatives of } e_p \text{ and } e_a.$$

[22]In joint ownership, we plug exogenous values into $\chi^{1-\alpha}$ and solve e_p^* in Equation (2.44). We plug e_p^* in Equation (2.42) and solve ϕ^*, the choice of ownership percentage in the first stage. We plug these values back into Equation (2.57) to obtain the expected level of utility.

[23]The expected utility of integration shifts with other parameters, such as α and $\bar{\theta}$. For example, a higher markup of a final market (i.e. a lower α) brings a higher expected utility of integration. We also find that the possibility of joint ownership increases with $\bar{\theta}$.

[24]The threshold value where the expected utilities are equivalent depends on the level of the other parameters such as θ, and δ. Figure 2.4 shows a case where the utility from outsourcing is almost greater than joint ownership.

of $\bar{\theta}$ with the upward rotation of line 2 (joint ownership). The threshold also changes by a higher value of δ (a higher utility by outside option available for an agent), which brings the downward shift of line 2 and line 3.

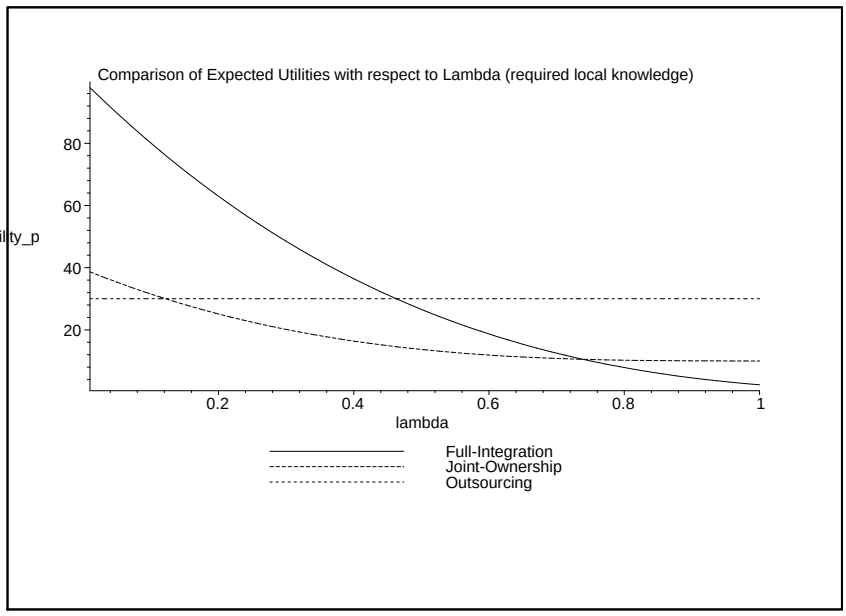


Figure 2.4: Comparison of Joint Ownership, Full-integration, and Outsourcing for λ

Second, the utility from joint ownership or outsourcing is a function of the expected technology of a local industry ($\bar{\theta}$). Table 2.5 shows how the choice variables are affected by the marginal change in $\bar{\theta}$. These are the changes in investments (K and L), efforts (e_p and e_a), ownership (ϕ), and transaction price ($\bar{p}$) set for an outsourcing contract. Other exogenous variables are specified as follows to compute the signs of the first- and the second-order derivatives: $\lambda = 1/2$, $r_p = 0.04$, $r_a = 0.05$, $w = 5$, $\beta = 1/3$, $\alpha = 0.9$, $A = 10^7$ and $\delta = 10$.[25] The values chosen for w, β, α, A, and δ are the same as used in Figure 2.4. Here, $\lambda = 1/2$ is set at its mean for the range of $0 < \lambda < 1$. We specify the borrowing interest rate for an agent as $r_a = 0.05 > 0.04$. The required rate for an agent is assumed to be higher for their higher risk of their business compared to that by a principal in developed economy.

A higher $\bar{\theta}$ is associated with a higher expected yield in processing, which encourages the initial physical investments. In outsourcing, a higher total cost of inputs urges a principal to offer a higher wholesale price $\bar{p}$ to an agent.[26]

[25] For outsourcing, we compute the derivatives (the first-order derivatives) as follows: $\frac{dK}{d\theta} = \frac{\partial K}{\partial \theta} + \frac{\partial K}{\partial e_a} \cdot \frac{de_a}{d\theta}$ for derivatives of K, and $\frac{d\bar{p}}{d\theta} = \frac{\partial \bar{p}}{\partial \theta} + \frac{\partial \bar{p}}{\partial e_a} \cdot \frac{de_a}{d\theta}$ for derivatives of $\bar{p}$.

		K	L	e_p	e_a	ϕ^*	$\bar{p}$
$\bar{\theta}$	Joint	$\frac{dK}{d\bar{\theta}} > 0$ $\frac{d^2K}{d\bar{\theta}^2} > 0$	$\frac{dL}{d\bar{\theta}} > 0$ $\frac{d^2L}{d\bar{\theta}^2} > 0$	$\frac{de_p}{d\bar{\theta}} < 0$ $\frac{d^2e_p}{d\bar{\theta}^2} > 0$	$\frac{de_a}{d\bar{\theta}} < 0$ $\frac{d^2e_a}{d\bar{\theta}^2} > 0$	$\frac{d\phi^*}{d\bar{\theta}} > 0$ $\frac{d^2\phi^*}{d\bar{\theta}^2} > 0$	n.a.
	Outsourcing	$\frac{dK}{d\bar{\theta}} > 0$	$\frac{dL}{d\bar{\theta}} > 0$	n.a.	$\frac{de_a}{d\bar{\theta}} < 0$	n.a.	$\frac{d\bar{p}}{d\bar{\theta}} > 0$

Table 2.5: Choice Variables and Their Marginal Changes with $\bar{\theta}$

When the expected local ability ($\bar{\theta}$) becomes higher in joint ownership, the production process becomes less dependent on the effort of an agent. Therefore, with a higher expected ability, a local producer can save its own effort. Then, the optimal ownership chosen by a principal increases with a higher value of $\bar{\theta}$ to compensate for the loss of yield due to making a smaller effort.

We next discuss how a change in $\bar{\theta}$ finally affects the expected utility through the choice of investments, efforts, ownership or transaction price. Figure 2.5 is a comparison of integration (line 1), joint ownership (line 2), and outsourcing (line 3). In full integration, the utility is independent of $\bar{\theta}$ as in line 1. The expected local ability positively affects the utility of a principal in joint ownership and outsourcing, but with different magnitudes. In joint ownership, a principal gains the combined benefits of increased yield and a reduced time for effort, as the expected local capacity increases. In outsourcing, an increase in an expected local capacity faces an offsetting effect of a decreased effort by an agent. Then the benefits on the total utility is not as high as those achieved by joint ownership.

In Figure 2.5 the highest utilities of the three organizational forms across the feasible range of $\bar{\theta}$ is achieved either by full integration (at the lower range of $\bar{\theta}$), or by joint ownership (at the higher value of $\bar{\theta}$). However, the threshold values depend on the value of the other parameters such as λ and δ. For example, by a higher value of λ, we observe downward shifts of line 1 (full-integration) and line 2 (joint-ownership), which may warrant the choice of outsourcing.

However, the threshold also changes by a higher value of δ (a higher utility by outside option available for an agent), which brings the downward shift of line 2 and line 3. Specifically, when $\bar{\theta}$ is low, a principal has to pay more than it earns to an agent to compensate δ, the minimum level of utility for an agent. Therefore, outsourcing is less likely to be chosen in such cases.

[26] We plug in the choice of e_a^* (effort by an agent) to Equation (2.54) in section 3.3. Equation (2.54) thus shows the relation between $\bar{\theta}$ and $\bar{p}$.

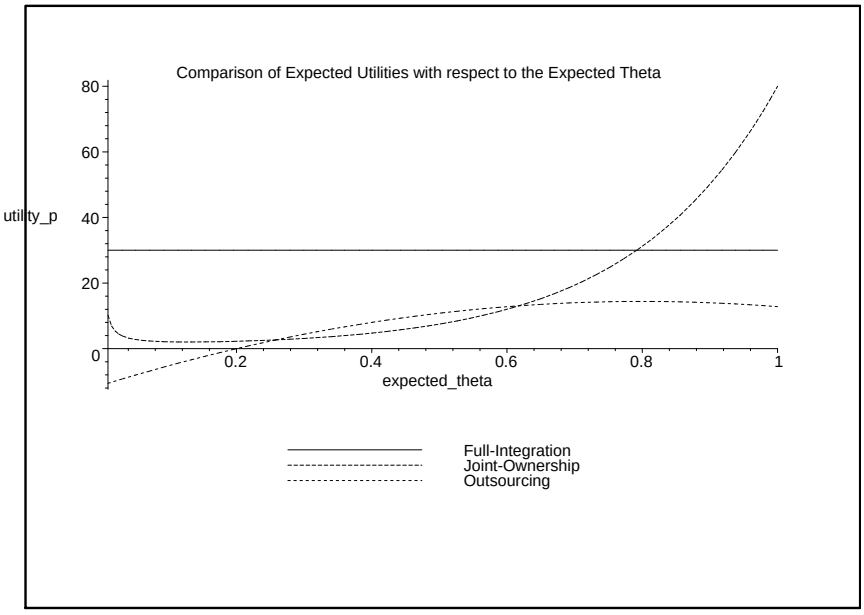


Figure 2.5: Comparison of Joint Ownership, Full-Integration, and Outsourcing for $\bar{\theta}$

Lastly, we unify the changes in expected utility from λ and $\bar{\theta}$. Figure 2.6 illustrates the choice of organizational forms with changes in two exogenously given parameters: θ (the degree of expected capacity in a local industry) in X-axis, and λ (the required local knowledge that a principal has to learn) in Y-axis.

First we state that, as long as λ (required local knowledge for an MNE) is low enough, full-integration is the first best choice. Then we consider changes in environments in two directions. One is the case where we may expect a high level of local technological ability, which corresponds to the shift of $\bar{\theta}$ from low to high values in X-axis. The other is the case where an MNE comes to face a higher requirement of local knowledge to learn, which corresponds to the shift of λ from low to high values, in Y-axis.

In the former case (i.e. an increase in $\bar{\theta}$), joint ownership is more likely to be the first best choice, as an increase in expected yield, and a reduction in effort may have a combined benefit to the expected utility, which may exceed the utilities of integration and outsourcing.

In the latter case (i.e. an increase in λ), expected utility from full integration decreases significantly. Then either outsourcing or joint ownership is relatively better off.

We therefore compare the expected utility from outsourcing and joint ownership. In joint ownership, a principal participates in production processes and controls efforts or ownership for a higher expected yield and utility.

By contrast, in outsourcing, the principal does not participate in production processes.

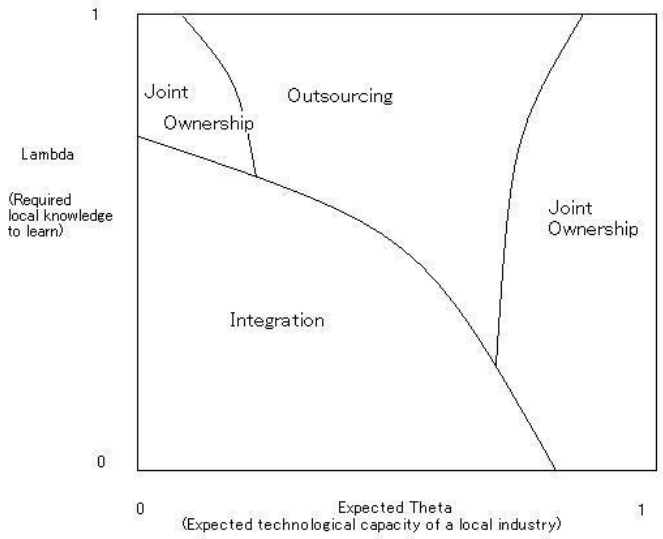


Figure 2.6: Choice of Organizational Forms by λ and $\bar{\theta}$

Then the expected yield (i.e. $\bar{\theta}e_a$) is delegated to the achievement by an agent and by the expected level of local capability. Thus, in the cases where the expected ability is too low (i.e. low $\bar{\theta}$), or where the agent's choice of effort is too scarce (due to a high value of $\bar{\theta}$), the expected utility of a principal is not likely to exceed that from joint ownership.

Therefore, in Figure 2.6, the joint ownership appears as the first best choice where $\bar{\theta}$ is too low, or too high. However, the outsourcing appears as the first best choice as the required level of local knowledge (λ) becomes higher at the intermediate range of $\bar{\theta}$.

2.5 Conclusions

In this paper, we question why a foreign affiliate could either be a fully owned affiliate of an MNE or a jointly owned affiliate, in which both a parent firm and a local investor serve as the owners. We also investigate what factors would drive owners to decide the equity shares of their parties if an affiliate is jointly owned.

We investigate these questions using affiliate-level data. In this paper, we discuss how

some firm-level and industry-level characteristics interact to define the corporate structure. We obtain some insights from a joint venture contract for a foreign-funded affiliate in China, and we then see how a foreign and a local owner divide tasks.

Compared to full integration, a foreign investor in joint ownership partially gives up using its technological ability and managerial control. Instead, an investor obtains local knowledge and may save its own effort. When a joint ownership is chosen, the ownership is defined at the level that balances the benefits and losses.

Compared to outsourcing, a foreign investor in joint ownership has to take its lack of local knowledge into account as a disadvantage. It also has to exert effort in processing. On the other hand, the investor benefits from its higher processing technology, lower cost of capital, and better control over investments through the ownership of a firm.

We investigate these three organizational forms and argue what works as the condition for joint ownership. In joint ownership, we first find that the marginal loss from an increase in λ (a required local knowledge) is smaller than that in integration. We also find that the marginal benefit from an increase in $\bar{\theta}$ (expected technology) is greater than that in outsourcing either at high values or very low values of $\bar{\theta}$.

Therefore, joint ownership is likely to be better off than full integration when we have a certain large value of λ. In addition, joint ownership is likely to better of than outsourcing when we have a certain large values, or a small values of $\bar{\theta}$. When λ is small, and when $\bar{\theta}$ is low enough to keep the principal's relative advantage in technological knowledge, investors then choose full integration.

We also argue how an MNE's percentage of ownership responds to these characteristics when joint ownership is chosen. An MNE delegates its ownership control to a local party (1) as an expected absorptive capacity decreases, (2) as access to location-specific knowledge becomes harder to come by, and (3) as the competition in final markets becomes more intense.

Given these findings, we intend to expand the theoretical investigation into the following direction. First, we need to generalize the roles of a potential foreign entrant and a local firm. In our model, the underlying assumptions and situations, such as modes, industries, and locations, are still restrictive to describe the comprehensive pictures of FDI and cross-border joint ventures. Second, we might need to endogenize the contractual environment as a function of the location and number of foreign entrants. As Nunn (2007) shows, the contractual environment is different across countries. It then works as a comparative advantage to induce trade and foreign direct investment.

This paper also points to some avenues for future research. The most important concern is the welfare effect of joint ownership. We might investigate whether co-ownership has influential effects on the productivity growth of an affiliate itself. We might also need to discuss the influence on local industries. For example, Smarzynska (2004) has reported that partially owned MNEs have significantly positive spillover effects by enhancing Total Factor Productivity (TFP) of local industry through their purchase of local intermediate products, whereas fully foreign-funded firms do not. The application of this type of analysis into various host economies or host-home pairs would warrant further investigation.

2.A Appendix: Contracts for Joint Ownership

We cite a contract to show how both parties typically divide tasks for each in operation. As described below, a local party is responsible for transaction-related business, and a foreign party is responsible for quality control and training of technical workers. Then parties also decide destination and distributors for sales of their products.

Article 14

Party A and Party B shall be respectively responsible for the following matters.

Responsibility of Party A:

a) Handling of application for approval, registration, business license and other matters concerning the establishment of the Company and liaison with the relevant departments in charge of China;

b) Processing for applying for the right to the use of the premises and other engineering facilities of the Company;

c) Providing cash, machinery and equipment and premises in accordance with the stipulations in Article 11;

d) Assisting Party B for processing import custom declarations for the machinery and equipment contributed by Party B as investment and arranging the transportation within the Chinese territory;

e) Assisting the Company in purchasing or leasing equipment, materials, raw materials, articles for office use, means of transportation and communication facilities etc;

f) Assisting the Company in contacting and settling the fundamental facilities such as water, electricity, transportation etc;

g) Assisting the Company in recruiting Chinese management personnel, technical personnel, workers and other personnel needed;

h) Assisting foreign workers and staff in applying for the entry visa, work license and processing their traveling affairs;

i) Responsible for handling other matters entrusted by the Company.

Responsibility of Party B:

a) Providing cash, machinery and equipment, industrial property in accordance with the stipulations in Article 11, and responsible for shipping capital goods such as machinery and equipment etc contributed as part of the investment, to a Chinese port;

b) Handling other matters entrusted by the Company, such as selecting and purchasing machinery and equipment outside China, etc;

c) Providing needed technical personnel for installing, testing and the trial production of the equipment as well as the technical personnel for production and inspecting;

d) Training the technical personnel and workers for the Company;

e) In case party B is the licensor, it shall be responsible for the stable production of qualified products of the Company in the light of design capacity within the stipulated period;

f) Responsible for other matters entrusted by the Company.

Article 20

The products of the Company will be sold both on Chinese market and on overseas market, the export part counts for [ ] percent, [ ] percent for domestic market.

Article 21

Products may be sold on overseas market through the following channels: The Company may directly sell its products on the international markets which accounts for [ ] percent. The Company may sign sales contract with the Chinese foreign trade companies, entrusting them to be the sales agencies or exclusive sales agencies, which account for [ ] percent. The Company may entrust Party B to sell its products, which accounts for [ ] percent.

Chapter 3

Ownership Determination in Foreign Direct Investment: An Empirical Analysis

3.1 Introduction

This paper examines the sources of variation in the equity structure of foreign direct investment (FDI) projects. We develop a theoretical framework in Chapter 2 based on actual joint venture and outsourcing contracts and apply it empirically to assess the relationship of equity share by foreign investors with the characteristics of industries and investing firms.

We analyze northern multinational firms that establish their affiliates in southern countries in a general setting in this dissertation. In this Chapter, specifically, we use the data of the outgoing FDI from Japan to surrounding Asian economies in our empirical analysis.

When investors set out to conduct business across borders, they choose an organizational form of overseas operation suitable to their purpose, scope, and scale of production. Joint ownership with a local partner is one of such organizational forms. In looking at the circumstances under which a joint venture is chosen along with the equity structure it employs, we will investigate what factors were involved in these choices and also analyze the strengths or weaknesses of their effects.

Why do firms choose joint ownership? The motivations for joint ownership may come from what a local partner can offer in production and management or from a local government's legal requirements. For example, a local partner may offer advanced manufacturing processes or well-developed supply chains that a foreign investor initially does not have

access to. In other cases, a local government may define some laws on taxes, permissions, limit of ownership, or other requirements on the basis of local content. A foreign investor may then choose a local partner in order to obey these political requirements.

Why does the choice of organization matter? The decision to stand alone, to enter a joint venture, or not to enter into foreign countries affects the expected payoff or net profits of foreign investors and local investors. In addition, the types and the amounts of incoming foreign investments are also of concern to policymakers who are in charge of enacting corporate laws regarding foreign investment.

Policymakers may be interested in a way to achieve the highest productivity for their economy. In the vertical type FDI, for example, firms fragment production geographically as it enables them to benefit from lower production costs.[1] Local industries retain profits by providing intermediate products. In the horizontal type FDI, firms undertake investments in order to gain some advantage in supplying local or regional markets.[2] Local industries then retain profits by providing final goods directly.

Activities by local industries may also affect the spillover gains through a transfer of skills, which are embodied in the products or human capital of an MNE. The amounts of investment may influence the local factor prices, such as wages, cost of capital, and land prices.

In our model specification, we argue whether or not the following four factors are influential: (1) local industrial absorptive capacity, (2) familiarity with the local market's business environment, (3) capital intensity of an industry, and (4) market competition in downstream markets (markets of final products). The first factor indicates the cost or risk of having a local producer as a partner. A firm, as an investor, takes this factor into account when it chooses joint ownership or outsourcing. The second factor shows the benefits of having a local partner. In a foreign-funded affiliate, a foreign investor considers the lack of local knowledge as a disadvantage. The third factor makes a difference in the cost of production. Foreign-funded firms usually borrow at a lower rate than local firms. This holds true when local producers in less developed countries are required to earn a higher rate of return in exchange for their higher country risk. The fourth factor captures the difference in profitability across industries. This affects a local firm's incentive to participate in a joint ownership.

[1] In the vertical type FDI, firms transfers one or more of a firm's stage of production abroad. It is generally performed to access low-cost inputs and to use outputs to supply other parts of the MNE's operation by means of intra-firm exports.

[2] In the horizontal FDI, firms duplicate part of a firm's activities in a foreign country.

In our empirical analysis in this Chapter, we primarily investigate the following economic factors: the local procurement network for each local industry, the history of foreign operation by MNEs (multinational enterprises), and the technological specificity held by foreign firms. We also consider the existence of industry-level ownership restrictions and the related enforcement mechanisms for foreign investors. These include a specific limit of foreign ownership, local content requirements, tax burdens, and permissions for operation. We consider these political factors in addition to the factors proposed in the model, and we then analyze their effects.

Let us show the variations of ownership structure observed in some countries. Table 3.1 shows the ownership structure of Japanese-owned manufacturing foreign affiliates in 1996 and in 2002 for each host country.

China and ASEAN

China	*1996*		*2002*	
minority (less than 50%)	140	20.3%	290	19.3%
majority	381	55.4%	681	45.4%
100% foreign-owned	167	24.3%	528	35.2%
Total	688		1,499	
Thailand	*1996*		*2002*	
minority (less than 50%)	314	69.6%	373	45.1%
majority	79	17.5%	286	34.6%
100% foreign-owned	58	12.9%	168	20.3%
Total	451		827	
Malaysia	*1996*		*2002*	
minority (less than 50%)	116	34.0%	158	29.7%
majority	73	21.4%	118	22.2%
100% foreign-owned	152	44.6%	256	48.1%
Total	341		532	
Indonesia	*1996*		*2002*	
minority (less than 50%)	91	30.7%	86	17.8%
majority	180	60.8%	277	57.5%
100% foreign-owned	25	8.4%	119	24.7%
Total	296		482	

NIES

Singapore	*1996*		*2002*	
minority (less than 50%)	46	10.0%	63	9.3%
majority	91	19.9%	101	14.8%
100% foreign-owned	321	70.1%	517	75.9%
Total	458		681	
Taiwan	*1996*		*2002*	
minority (less than 50%)	82	23.0%	113	21.0%
majority	167	46.8%	225	41.9%
100% foreign-owned	108	30.3%	199	37.1%
Total	357		537	
South Korea	*1996*		*2002*	
minority (less than 50%)	74	39.6%	105	32.5%
majority	70	37.4%	109	33.7%
100% foreign-owned	43	23.0%	109	33.7%
Total	187		323	
Hong Kong	*1996*		*2002*	
minority (less than 50%)	52	11.0%	53	8.1%
majority	110	23.2%	136	20.9%
100% foreign-owned	312	65.8%	463	71.0%
Total	474		652	

: Data source is the *Basic Survey of Overseas Business Activities*

: We classify Japanese-owned foreign affiliates in manufacturing in 1996 and in 2002 for each host country.

: We classify affiliates as "minority-owned" if Japanese investors provide less than 50% of the equities.

: We classify affiliates as "majority-owned" if Japanese investors provide 50% or more of the equities, but less than 100%.

Table 3.1: Equity Structure of Japanese-owned Manufacturing Foreign Affiliates

First, there is a wide country-level variation in ownership structure. For example, the share of 100%-owned foreign affiliates is more than 65% in Singapore and Hong Kong but less than 30% in Thailand and Indonesia. Some research on cross-country analysis indicates that the differences in infrastructure, rule of law or contracting environment, trade policies, average schooling, and the existence of a black market are statistically significant reasons

for such variation.[3]

Second, however, there are some common characteristics across countries. In all the economies listed in Table 3.1, (1) the share of minority-owned firms declines, and (2) the share of 100% foreign-owned firms increases. In addition, the number of manufacturing affiliates has increased in every economy. Therefore, we put emphasis on underlining economic factors to understand these trends.

In the literature, empirical analysis that clearly explains the within-country variation of foreign ownership is scarce. We introduce some of the research discussing firm-level and industry-level differences in the likelihood of international joint venture and ownership decisions.

Feenstra and Hanson (2005) investigate the conditions under which an MNE delegates procurement service to local firms. This, in fact, is not the research on joint ownership or the allocation of equity stakes, but it provides profound insight into the likelihood of a partnership between foreign and local firms. The researchers use the registry of foreign firms in Chinese cities and connect it with the customs declaration of goods from these cities. They find that the delegation frequently occurs when the value added to products in an industry is high and input materials are non-specific. They infer that MNEs work with local firms when local activity (procurement) is a low-risk and low-return part of their business in terms of profitability and measurement.

Asiedu and Esfahani (2001) investigate cross-sectional data of U.S.-owned firms operating in foreign countries. They show some statistically significant results: (1) an MNE owns a larger equity share as the sales per assets (a proxy for productivity) in its affiliate becomes higher; (2) an MNE owns a smaller share as it extends its diversity by establishing foreign affiliates; (3) an MNE owns a smaller share when it is more dependent on local natural resources. We can then infer that ownership reflects the assets of MNE, the diversity of foreign affiliates, and the use of local resources.

Nakamura and Xie (1998) use cross-sectional data of foreign-owned firms operating in Japan. They find that an MNE owns a smaller share if the number of workers of a foreign affiliate (a proxy for monitoring costs) is larger. This implies that, to manage a large number of workers, foreign firms tend to rely on local partnership.

The last two papers are, to the best of our knowledge, the only papers that discuss the determinants of equity capital stakes in joint ownership from an empirical viewpoint.

However, we identify a certain degree of weakness in the literature. First, there is the

[3]See Nunn (2007) and Asiedu and Esfahani (2001), for example.

possibility of endogeneity. By using cross-sectional data from a single year, the likelihood exists that some explanatory economic variables are not the cause but, rather, the result of the ownership structure. Therefore, some factors are associated with equity shares, but they are not confirmed as determinants. Second, there is a lack of available firm-level and industry-level explanatory variables, and these are also limited by the small sample. Third, not all of the explanatory variables have relevance to theoretical specifications. Thus, the results may possibly be distorted as a result of adding variables without theoretical justification.

We attempt to ameliorate these weaknesses. Firstly, we use 5,336 newly entered Japanese-owned foreign affiliates as our sample. Then we investigate the firm-level or industry-level characteristics observed prior to the new entry of an affiliate. This means that we choose exogenous variables that can influence ownership but are not affected by it. It is also important to focus on the first year of each affiliate, since the initial equity allocation of a firm is free from the persistence from the previous records.[4] Secondly, we classify entrants by motivations (types) for foreign investments because the motivations for FDI and ownership decisions are closely related. Some firms are producing and selling products locally, and others are manufacturing to export. These two types of firms then face different regulations and different information about their sales markets. Hence, a different ownership structure may apply. Thirdly, we link each parameter of our theoretical inference with a single variable from the data. We then add country, industry, and year dummies as control variables.

The determinants and their effects that we analyzed, which are our main arguments in this Chapter, may give some additional implications for the patterns of overseas activities in the future.

One debate in the empirical field is whether outsourcing dominates the FDI, or FDI dominates the other, or how the pattern prevails. We have not yet reached a firm conclusion on the actual pattern of these activities.

When the high abilities of local firms provide well-established procurement network and logistics, it encourages foreign investors to do outsourcing. On the other hand, overseas activity may also be carried out in an integrated way by multinational firms. This may be the case when foreign investors are motivated to keep their firm-specific knowledge or their accumulated experiences in FDI. Statistics shows that the sourcing of inputs from foreign countries has increased at a rapid pace, both via outsourcing and via FDI. It is not

[4]We find that the initial equity allocation is a persistent and inelastic decision according to the statistics we use. See Table 3.5.

empirically certain, however, whether one dominates the other, and we are interested in adding some implications to this debate.

This paper is organized as follows. In the next section, we introduce the data sets and explain how the firms are selected. In Section 3, we show how the dependent and independent variables are chosen. They are chosen to avoid the endogeneity problem as well as to emphasize the relevance to our model specification. In Section 4, the estimation and results are illustrated. The last section is the conclusion reached from the empirical findings.

3.2 Data

In this section, we introduce the data sets and the information we used. We use the data of foreign affiliates of Japanese firms from *The (Basic) Survey on Overseas Business Activity* (fiscal years 1995 to 2002).[5] This survey is conducted by the Ministry of the Economy, Trade, and Industry (METI) of Japan targeting all the Japanese-owned foreign affiliates located worldwide and their parent comapnies.[6]

We also use the data containing the information of the parent companies of foreign affiliates more in detail. We use the data from *The Basic Survey of Business Structure and Activity* (fiscal years 1995 to 2002). This is the census-coverage data of companies by compulsory survey, though small enterprises are exempted.[7]

The former database cover the following basic information of the parent firm: the number of employees, industry, sales, trade, and the number of foreign affiliates and their locations. Whereas, the latter database cover the following information of the parent firms: ownership structure, balance sheets, profit and loss statements, breakdown of sales and purchase, international trade (including intra-firm trade), R&D and IT investments, and transaction of intellectual property rights. Both of these statistics were used and processed under a confidential agreement between the Japanese government and the author.

We sort foreign affiliates by each host country. More than a half of all affiliates are located in Asia. In manufacturing, more than two-thirds of affiliates are located in Asian countries. Specifically, we select seven largest host economies in Asia in order of the total

[5] the Basic, or extensive survey is conducted once in every three years. (fiscal years 1995, 1998, 2001)

[6] The percentages of respondents for each year are 63.4% of the target in 2000, 62.9% in 2001, and 62.1% in 2002. It is a questionnaire-based survey declared by each foreign affiliate and its parent firm. This survey does not include the financial, insurance, and real estate industries (known as the FIRE sector).

[7] Companies with fewer than 50 employees or less than 30 million yen of paid-up capital (book value) are waived from the survey.

number of Japanese-owned foreign establishments. These affiliates are in China, Thailand, Singapore, Hong Kong, Taiwan, Malaysia, and Indonesia. With this selection, we have a sufficient number of firms in every 2-digit level industry in every year for each country. We construct the pooled sample of affiliates in Southern countries (China, Thailand, Malaysia, and Indonesia) and in NIES, Newly Industrialized Economies (Hong Kong, Singapore, and Taiwan), to compare the results.

From the database of foreign affiliates, we obtain the information for each affiliate about the location of suppliers, and the amount of purchases from them, the destination of its products, and the amount of sales. We also examine how many affiliates were launched by an MNE and in what country prior to the setup of each one of those.

From the database of parent companies, we use the information of firm size (the number of employees), and their ownership of foreign affiliates. We denote this data set as Data A. Combining the information available from the *Basic Survey of Japanese Business Structure and Activities*, we have more abundant information for each parent firm, although the available number of parent firms are smaller. We denote this data set as Data B. In Data B, the following statistics are additionally available: R&D expenditure, sales, profit, cost, capital stock, and wage payment of each firm. More importantly, we can construct aggregated industry-level variables such as capital intensity and markup.

We conduct estimation using both Data A and B, and report the results separately. In addition, to fit our analysis to our specifications, we assign the following conditions to our sample of foreign affiliates. Specifically, we select the affiliates that satisfy the following conditions:

1. MNEs and foreign affiliates are both manufacturing firms.

2. Foreign affiliates are established between 1996 and 2002.[8]

3. Foreign affiliates are funded by investors at home or in a host country.

4. We select affiliates of two types:
FDI for export platforms (known as vertical FDI), and

[8] We do not include affiliates established earlier than 1996 or firms acquired by foreign investors between 1996 and 2002. Some literature focuses on the equivalence or difference between a FDI project starting from green-field and a project by M&A. (See Nocke and Yeaple [2004], Head and Reis [2005], or Ferrett [2004].)

FDI for local sales (known as horizontal FDI).

The first condition eliminates the case in which MNEs and affiliates are in the service sector, which includes trading companies or private banks.

In the second condition, we choose the recently established firms to pool a sample of sufficient size. FDI projects toward Asian countries, specifically China, steadily increased after 1995. In addition, information about local policies for foreign investors has been periodically reported since 1995 (See Ito and Krueger ed. [2004]). We then obtain the information about country-level and industry-level local policies.

In the third condition, we omit affiliates funded by parent firms from any other third country. Specifically, exclusions are made when third investors were ranked as the largest or second largest shareholders. We here excludes the effects brought by third parties on shareholding decisions.

Using the fourth condition, we are able to compare the difference between the two types of FDI in terms of the significance and strength of each explanatory variable for ownership allocation. In addition, this classification is useful as some countries impose different political regulations with regard to local content requirements or limits of foreign ownership.

We assume that an affiliate is operating as an export platform when more than one half of its products are exported to foreign economies. Most of these are economies in Japan, North America, the E.U., and other Asian countries. In contrast, we assume that an affiliate sells locally when 50% or more of its products are sold in its domestic market.

We add some remarks here about the data of the ownership percentage for foreign affiliates analyzed for this study. Ownership decisions regarding foreign affiliates present the difference from those for domestic affiliates legally and financially. First, the equity of foreign affiliates is closed-held and not listed in the local stock market.[9] Secondly, profits of foreign affiliates are not included in the taxable income of multinational firms in the home country. Given these characteristics, we view ownership allocation as the decision of MNEs, and they primarily observe local manufacturers, rule of law, or local sales markets.

Table 3.2 shows the classification and the number of foreign entrants in each host country. The new entrants (i.e., foreign affiliates) into these seven Asian economies from 1996 to 2002 are composed of a total of 8,636 firms. 62% of those firms (5,336 firms) are manufacturers. In China and ASEAN countries, more than two thirds are manufacturing firms. In contrast,

[9]For screening, we use the database by Toyo-Keizai Incorporated, a private corporation in Japan.

New Entrants of Foreign Affilaites 1996-2002		Total Entrants	Manufacturing						Non-manufacturing	
					Export Platforms		Local Sales			
		number	number	% to total	number	% in mfg.	number	% in mfg.	number	% to total
China & ASEAN	**China**	*2431*	1,788	*74%*	565	32%	1,223	68%	643	*26%*
	Thailand	*1326*	886	*67%*	195	22%	691	78%	440	*33%*
	Malaysia	*898*	618	*69%*	195	32%	423	68%	280	*31%*
	Indonesia	*651*	503	*77%*	154	31%	349	69%	148	*23%*
	subtotal	*5306*	3,795	*72%*	1,109	29%	2,686	71%	1,511	*28%*
NIES	**Hong Kong**	*1193*	449	*38%*	214	48%	235	52%	744	*62%*
	Singapore	*1207*	495	*41%*	279	56%	216	44%	712	*59%*
	Taiwan	*930*	597	*64%*	143	24%	454	76%	333	*36%*
	subtotal	*3330*	1,541	*46%*	636	41%	905	59%	1,789	*54%*
	Total	*8636*	5,336	*62%*	1,745	33%	3,591	67%	3,300	*38%*

: Data source is the *Basic Survey of Overseas Business Activities.*

: We select new foreign affiliates into each host country from 1996 to 2002.

: We classify affiliates as "export platforms" (vertical type) when more than a half of its products are exported to foreign economies.

: We classify affiliates as "local sales" (horizontal type) when 50% or more of its products are sold in its domestic market.

Table 3.2: New Entrants from 1996 to 2002, by Country, Sector and by Mode of Operation

less than one half of the firms in Hong Kong and Singapore are in the manufacturing sector. Here, we classify the manufacturers into firms for export processing (known as vertical FDI) and firms producing for local sales (known as horizontal FDI). As we have reported, according to some existing research, the two types differ in their production and marketing. In addition, some governments enforce a different rule of law regarding ownership.[10]

Hence, investors decide their type of operation and ownership structure simultaneously upon entry. In our statistics, 33% of the manufacturing firms (1,745 firms) fit the criterion of export platforms, and 3,591 are sorted as firms for local sales.

We pool the affiliates in seven Asian economies (China, ASEAN, and NIES) for the analysis. We also pool the affiliates in China and ASEAN. With the latter group, we specifically discuss the ownership decision when the affiliates are established in developing economies.

3.3 Choice of Variables

[10] Hanson, Mataloni, and Slaughter (2003) explain that, in vertical FDI, consumers' markets are basically in developed countries. In this case, headquarters are likely to be the major investor of capital, providing firm-specific machinery, equipment, and technology. For the latter case (horizontal FDI), consumers reside in the host country. Here, the investment by headquarters for production might play a partial role, complementing the investment of local affiliates.

3.3.1 Explanatory Variables

In our specification of the model, we discuss some variables that are influential for the choice of corporate structure or equity allocation. In what follows, we explain how each parameter corresponds with a variable available from the data. We use additional control variables that have been the focus of past work. Specifically, we add a variable that indicates the existence of restrictive treatments by local government on foreign investors. We also add country, industry, year effects, and firm-specific variables, such as the R&D intensity and the size of an MNE.

We choose industry-level and firm-level information prior to the start of a new operation (i.e., the year $t-1$ for an event of a new entry at year t) for each foreign affiliate. In Table 3.3, we provide the definitions of the variables we used. In Table 3.4, we show the summary statistics for affiliates for export platforms and for local sales.

Variables	Description of the Variables	Source
MNE's Ownership	MNE's equity share for a foreign affiliate at the time of initial observation in the statistics	*Basic Survey of Overseas Business Activities (1995-2002, FY)*
Organization 1=Joint, 0=Full-integration	0=An entity is a 100% Japanese-owned Affiliate 1=An entity is a less than 100% Japanese-owned Affiliate	*Basic Survey of Overseas Business Activities (1995-2002, FY)*
Expected Local Absorptive Capacity Local Procurement of other affiliates in the same 2-digit industry, prior to the entry of the entity (**denoted as θ**)	(Σtotal locally purchased materials_i)/(Σtotal material inputs_i) by existing affiliates at year t-1, for each 2-digit industry, when a new firm enters at year t.	*Basic Survey of Overseas Business Activities (1995-2002, FY)*
Preceding FDI at Host (1=yes) FDI Experience of a Parent firm (in year t-1) in the Host country (**inversely related to λ**)	For each foreign affiliate, this variable is indicated as 1 if its primary Japanese investor was operating another foreign direct investment at the host/(Asian) country/(countries) in year t-1.	*Basic Survey of Overseas Business Activities (1995-2002, FY)*
Preceding FDI in Asia (1=yes) FDI Experience of a Parent firm (in year t-1) in other Asian countries (**inversely related to λ**)		*Basic Survey of Overseas Business Activities (1995-2002, FY)*
Capital Intensity of Products (denoted as β)	Computed by the aggregated firm-level data of fixed assets (capital stock), wage, and value added (in real terms) in industry i of Japanese firms. The data is classified by 3-digit JSIC code (We use 67 classifications). We follow the method of Bartelsman and Gray (2001)	*Basic Survey of Business Structure and Activities (1995-2002, FY)*
Markup The inverse of Product Substitutability (**denoted as 1/α**)	Markup=1/Alpha. The markup is calculated as the average of Sales/(Sales-Profit) over firms in the same 3-digit JSIC codes.	*Basic Survey of Business Structure and Activities (1995-2002, FY)*
R&D Intensity (R&D/Sales) of a MNE	R&D Expenditure/Sales	*Basic Survey of Business Structure and Activities (1995-2002, FY)*
Size of a MNE ln_(MNE's number of employees)	Number of total employees for parent firms	*Basic Survey of Overseas Business Activities (1995-2002, FY)*
Ownership Restriction (1=yes) We construct variables separately for two modes: **1.** Export platforms with Restriction 2. Local Sales with Restriction	We denote 1 if at least one of the following political treatments is written for specific industries. We consider political treatments on tax, permissions, limit of ownership, and local content requirements.	*JETRO-File* (1996-2003)

Table 3.3: Variables and Definitions

Expected Absorptive Capacity of a Local Industry

The expected absorptive capacity is the ability to manufacture products precisely tailored to a given order or a blueprint. If such an ability of local producers is higher, an MNE purchases most of its intermediate inputs from local firms.[11] The local procurement network is also an important way to hedge the risk of imports (unstable exchange rates, transportation costs, or some unpredictable barriers to trade).[12]

Therefore, we propose the local procurement ratio in each industry and year as the proxy for the absorptive capacity.[13] We constructed the variable as shown in Table 3.3. We count the quantities of intermediate products purchased from local firms by existing foreign affiliates and then divide it by the total amount of the purchase.

We suggest this variable as an appropriate measurement for the following reasons. First, it shows how local firms perform on average. This industry-level information is also available for an MNE even when it cannot identify the ability of each potential partner. Secondly, the variable is given independently for an incoming affiliate. Thirdly, it is observable prior to an entry.[14]

In Table 3.4, the local procurement ratio is about 40% (with the standard deviation of 22%). The percentage is slightly higher in the horizontal type of FDI, although we did not find distinctive differences.

Required Local Knowledge for MNEs

The required local knowledge for an MNE is a managerial skill for applying the rule of law and local customs during product processing. This includes activities such as obtaining legal permission for their operations and hiring/training local workers.

It is difficult to obtain a quantitative measure for knowledge. We instead propose two indicators to describe the familiarity with local knowledge when an MNE starts a new FDI.

[11] This may not be the case if the purchase is due to some political constraint, such as import quotas or local content requirements. We, therefore, add industry dummies and an indicator for local policies as control variables.

[12] Some firms are seeking access to natural resources (oil, coal, iron, or wood) and may not have options to import. We control such characteristics by industry dummies.

[13] Kiyota et al. (2005) state that local procurement shows the local backward linkage of multinational firms, and it is important both for incoming foreign firms (as a network for stable business activities) and for host economies (as a channel of spillovers).

[14] For example, the variable (the sum of local inputs/sum of total inputs) in industry i in year 1995 is public information. It is available for a firm that planned to enter industry i of a host country in 1996. In other words, we employ the statistics of peer firms. Alvarez and Gorg (2005) provide evidence that the presence of other multinationals influences a plant's survival as a result of productivity improvements of the multinationals.

Summary Statistics (Export Platforms: Vertical FDI)

	ASEAN, China, NIES			ASEAN, China		
	Export Platforms (vertical)			Export Platforms (vertical)		
Variable	Obs	Mean	Std.Dev	Obs	Mean	Std.Dev
MNE's Ownership Percentage	1745	82.5%	24.2%	1109	78.5%	25.0%
1=Joint, 0=Full-integration	1745	48.5%	50.0%	1109	58.3%	49.3%
Local Procurement Ratio (t-1)	1745	36.3%	21.8%	1109	39.8%	22.0%
Preceding FDI at Host (1=yes)	1742	9.0%	28.6%	1107	9.9%	29.9%
Preceding FDI in Asia (1=yes)	1745	62.7%	48.4%	1109	61.2%	48.7%
Ownership Restriction (1=yes)	1745	5.7%	5.6%	1109	5.8%	6.0%
Capital Intensity (3-digit level)	1206	0.303	0.080	845	0.311	0.079
Markup (3-digit level)	1139	1.037	0.017	741	1.036	0.018
R&D Intensity (R&D/Sales)	1335	2.9%	2.9%	843	2.7%	2.8%
ln_(MNE's # of employees)	1481	7.228	1.605	934	7.258	1.632

: We classify affiliates as "export platforms" if more than a half of its products are exported to foreign economies.

Summary Statistics (Local Sales: Horizontal FDI)

	ASEAN, China, NIES			ASEAN, China		
	Local Sales (horizontal)			Local Sales (horizontal)		
Variable	Obs	Mean	Std.Dev	Obs	Mean	Std.Dev
MNE's Ownership Percentage	3591	68.2%	28.3%	2686	64.2%	27.6%
1=Joint, 0=Full-integration	3591	68.3%	46.6%	2686	76.1%	42.7%
Local Procurement Ratio (t-1)	3536	38.6%	22.0%	2649	40.0%	21.4%
Preceding FDI at Host (1=yes)	3587	10.1%	30.2%	2683	9.5%	29.4%
Preceding FDI in Asia (1=yes)	3591	66.9%	47.1%	2686	67.9%	46.7%
Ownership Restriction (1=yes)	3591	6.6%	5.3%	2686	6.5%	5.2%
Capital Intensity (3-digit level)	3211	0.293	0.076	2235	0.291	0.078
Markup (3-digit level)	2750	1.041	0.020	1860	1.039	0.020
R&D Intensity (R&D/Sales)	3228	3.2%	3.0%	2262	3.1%	2.9%
ln_(MNE's # of employees)	3517	7.801	1.577	2485	7.857	1.582

: Capital intensity, markup, and R&D intensity are computed using the *Basic Survey of Business Structure and Activities.*

: Other variables are computed by the *Basic Survey of Overseas Business Activities.*

: We classify affiliates as "local sales" if 50% or more of its products are sold in its domestic market.

: ASEAN economies include Thailand, Malaysia, and Indonesia.

: NIES economies include Hong Kong, Taiwan and Singapore.

Table 3.4: Summary Statistics by Modes of Operation.

First, as stated in Table 3.3, we investigate whether or not a new entity will be the first affiliate in each host country. Indicator 1 denotes that a parent already has at least one other foreign affiliate in the same host country. Indicator 0 means that the parent has no experience of FDI in the host country upon entry, and it implies that a parent firm has to learn a lot about the local environment. We also check whether a parent firm has at least one existing foreign affiliate in any other Asian country. We use indicator 1 when a parent has such an entity as of the year $t-1$, and, otherwise, we use 0.

Table 3.4 shows that about 10% of new entrants are established in an economy in which their parents have the preceding FDI experience in the previous year. We also note that more than 60% of new entrants are established by MNEs that have experienced FDI in other Asian (excluding host) economies.

Other Characteristics

As the other important explanatory variables, we suggest capital intensity and markup in the industry of an affiliate. We may also need to consider some characteristics of the parent firms. Lastly, we consider the effects of political treatment on foreign investors.

1. Characteristics of the industry of affiliates and parent firms.

To compute the capital intensity, it is best to use 3-digit industry-level statistics for each host country, but the required information (e.g. capital stock, material inputs) is not consistently available for all the host economies that we investigated.[15] Therefore, instead, we apply the industry-level capital intensity of Japan as the proxy for other countries. Following Bartelsman and Gray (2001), we compute the cost shares of capital by 3-digit level classification. We use 187,003 Japanese (domestic) firms observed from 1995 to 2002 from *The Basic Survey of Business Structure and Activity*. In Table 3.4, we find that the capital intensity is, on average, 0.30 for vertical FDI (0.29 for horizontal FDI), with the standard deviation across industry being 0.07.[16]

We also compute the industry-level markup for each 3-digit industry. We measure the markup from the aggregate sales divided by the aggregate cost (i.e., sales/[sales-profit]).[17]

[15] As another source of information, UNIDO Industrial Statistics (INDSTAT) provides information of the value added and share of wages in value added at a 3-digit or 4-digit level. We then compute the cost shares of labor, and we use [1-cost shares of labor] as an alternative measure of capital intensity. In our analysis, the regressions using β from the statistics do not change the significance of the coefficients.

[16] If an affiliate's industry does not correspond precisely with the constructed industry-level data, we report this capital intensity as a missing variable.

[17] This is a frequently used measure in empirical research for industry-level markup (e.g., Keller and Yeaple

We then obtain an average markup of 1.04, with a standard deviation of 0.02.

2. Characteristics of the parent firms.

We use the following characteristics of the parent firms: (1) R&D intensity, (2) Size, and (3) Industry dummies of parent firms. The R&D intensity is the ratio of R&D spending to sales. The size of a parent firm is represented by the logarithm of the number of employees. Industry dummies are given by the 2-digit industry-level classification of parent firms. Table 3.4 shows that the R&D expenditure of a parent firm is 2.7% to 3.2% of sales on the average, and the firm-level difference is large. The average size of a parent firm is 7.2 (1,340 employees) for the vertical FDI and 7.8 (2,440 employees) for the horizontal FDI. The average R&D intensity and the average size of a parent firm are larger in a horizontal FDI.

3. Political treatment on foreign investors.

Lastly, we consider the political treatment of foreign investors through taxes, permission, limit of ownership, and local content requirement. We collect the industry-level description of these regulations from *JETRO-File* (annual data of 1996-2003).[18] We construct an indicator for each 2-digit industry-level classification. We denote 1 when any one of these enforcement mechanisms is written, and, otherwise, 0. Here, we do not include the uniform treatment toward the whole industry in a country. We do not include promotion policies without any disclaimer either. In Table 3.4, we observe that 5.7% of the vertical FDI and 6.6% of the horizontal FDI are operating in an industry with some political regulations for foreign investors.

3.3.2 Dependent Variables: Corporate Structure

The dependent variable for the organizational form is an indicator variable: 1 if a new entrant is jointly owned, and 0 if it is fully integrated. The dependent variable for allocation of ownership is the reported equity capital stake for each affiliate at the startup.[19]

[2004]). We conceptually use price divided by average cost, instead of using price divided by marginal cost. The exact estimation of markup is rarely done. As one of few contributions, Lai and Zhu (2004) estimate the elasticity of substitution as 3.99 for traded commodities. This means $\alpha = 0.749$, and $markup = 1/\alpha = 1.334$ in our notation. They note that the Japanese market has notably inelastic substitution (i.e., lower α and higher markup) than the average of OECD countries.

[18] JETRO (Japan External Trade Organization) is a public agency providing information about international trade and investment. The original reports are released from each host country.

[19] Some are funded by other MNE affiliates. We also include such sub-affiliates in our analysis. The ownership ratio by headquarters is weighted as follows: the percentage of ownership of sub-affiliates

We use the information about the initial equity allocation of the new establishments. This is because of the persistence of the initial equity allocations and the endogeneity of a firm's initial ownership and its operations after entry.

First, we point out the transition of ownership percentage by MNEs in Table 3.5. Table 3.5 records whether the ownership percentage of an MNE has decreased, increased, or stayed at the same level from the startup of an affiliate. We take the information from the affiliates operating for more than 7 years by the year 2002. Among the affiliates in the Asian countries, 82.6% of them did not change the ownership percentage of MNEs. In the developed countries shown in Table 3.5, 89.5% of affiliates did not change the ownership percentage. We, therefore, focus on the equity allocation of affiliates in the first year.

	Number of subsiriaries	Increased	**Unchanged**	Decreased
China	1676	10.3%	**85.9%**	3.8%
Thailand	1449	12.5%	**79.0%**	8.5%
Malaysia	1049	9.6%	**80.2%**	10.2%
Indonesia	683	18.3%	**72.8%**	8.9%
Hong Kong	1416	8.5%	**87.7%**	3.8%
Singapore	1428	9.2%	**87.7%**	3.2%
Taiwan	1157	14.5%	**77.4%**	8.0%
South Korea	596	10.6%	**79.7%**	9.7%
subtotal	9454	11.3%	**82.6%**	6.2%
U.S.A.	5635	7.6%	**89.6%**	2.8%
U.K.	1205	7.1%	**90.5%**	2.5%
Germany	987	8.2%	**89.5%**	2.3%
Holland	595	5.5%	**93.3%**	1.2%
Canada	596	8.1%	**89.9%**	2.0%
Australia	848	12.7%	**84.4%**	2.8%
subtotal	9866	8.0%	**89.5%**	2.5%

: Data source is the *Basic Survey of Overseas Business Activities.*

: We take the information from the affiliates operating for more than 7 years at the year 2002.

: We record whether the ownership percentage of a MNE has increased, decreased, or stayed at the same level from the startup of an affiliate.

Table 3.5: Changes in Ownership Percentage by MNEs from the Initial Level, by Country

held by its direct investor is multiplied by the percentage of ownership over such a direct investor held by a multinational firm. The establishment of Japanese firms surveyed in the statistics is defined by one of the following three characteristics: 1) a foreign affiliate in which Japanese corporations have invested capital of 10% or more; 2) a foreign affiliate in which another foreign affiliate (funded more than 50% by a Japanese corporation) has invested capital of more than 50%; 3) a foreign affiliate in which a Japanese corporation and another foreign affiliate (funded more than 50% by Japanese corporations) have invested capital of more than 50%.

As the second reason, we state the endogeneity in which exogenous variables to explain an ownership allocation are influenced by its firm's choice of ownership. This reverse causality may happen when we try to explain some ownership allocations that have occurred several years after establishment. For example, the local procurement activity by each industry is an exogenous factor for a firm about to enter, but not for existing firms, since firms in operation may influence another firm's activity.

Table 3.4 shows the organizational choice by type of operation. 48.5% of affiliates for export platforms and 68.3% of affiliates for local sales choose joint ownership. When affiliates are in China or in ASEAN countries, 58.3 % of the export platform type and 76.1% of the local sales type choose joint ownership.

3.4 Estimation and Results

3.4.1 Probit Analysis for the Likelihood of Joint Ownership

We first apply the probit estimation to explain the discrete choice of full-foreign ownership ($y_{1i} = 0$: no local capital participation) or joint ownership ($y_{1i} = 1$: local equity participation). The latent variable y^*_{1i} shows the parent firm's underlining (unobservable) utility, which defines the corporate structure (full-ownership or joint ownership). The empirical model y_{1i} (indicator variable) is written as follows:

$$y^*_{1i} = \beta'_1 X_{1i} + \epsilon_{1i} \text{ where } \epsilon_{1i} \tilde{} N(0, \sigma_1^2) \text{ and } y^*_{1i} \tilde{} N(\beta'_1 X_{1i}, \sigma_1^2) \tag{3.1}$$

$$\text{Our observation} = \begin{cases} y_{1i} = 0 & (\text{if } y^*_{1i} \leq 0) \\ y_{1i} = 1 & (\text{if } y^*_{1i} > 0) \end{cases} \tag{3.2}$$

The assumption of zero for the threshold is an innocent normalization. We define the probability of $y_{1i} = 1$ as follows:

$$\begin{aligned} \Pr(y^*_{1i} \geq 0) &= \Pr(\beta'_1 X_{1i} + \epsilon_{1i} \geq 0) \\ &= \Pr(\frac{y^*_{1i} - \beta'_1 X_{1i}}{\sigma_1} < \frac{-\beta'_1 X_{1i}}{\sigma_1}) \\ &= \Psi[\frac{\beta'_1 X_{1i}}{\sigma_1}] \end{aligned}$$

Conversely, the probability that $y_{1i} = 0$ is $\Pr(y_{1i}^* < 0) = 1 - \Psi[\frac{\beta_1' X_{1i}}{\sigma_1}]$. Using these expressions, the likelihood function is given as follows:

$$\mathfrak{L}_\mathfrak{p} = \prod_{i=1}^{n} \left[\Psi[\frac{\beta_1' X_{1i}}{\sigma_1}]\right]^{y_{1i}} \quad \left[1 - \Psi[\frac{\beta_1' X_{1i}}{\sigma_1}]\right]^{1-y_{1i}}$$

By taking the logarithm of the likelihood function, we obtain:

$$\log \mathfrak{L}_\mathfrak{p} = \sum_{i=1}^{n} \left[y_{1i} \times \log \Psi[\frac{\beta_1' X_{1i}}{\sigma_1}] + (1 - y_{1i}) \times \log(1 - \Psi[\frac{\beta_1' X_{1i}}{\sigma_1}])\right]$$

The parameter values for the β_1 vector and the ancillary parameter σ_1 are chosen to maximize $\log \mathfrak{L}_\mathfrak{p}$. Maximum Likelihood estimation produces consistent estimates of the parameters in the probit model under assumptions such as homoscedasticity and normality of the error terms.

3.4.2 Combination of the Probit Model and Truncated Regression Model for Allocation of Ownership

We further investigate how MNEs determine the ownership percentage of their affiliate. We denote the discrete choice of 0 and 1 in the probit model. We use 0 for a fully foreign-owned affiliate, and we set 1 for a jointly-owned affiliate. For the second stage, we keep this direction of an indicator for the dependent variable, i.e., the non-limit (positive) observation. This means that we use the percentage of ownership by local investors as the dependent variable. We then use tables to show the results of the ownership by MNEs by converting the signs of the coefficients. For example, the determinants explaining a change of a local investor's ownership from 20% to 30% show the precise reasons for a change in an MNE's ownership from 80% to 70%. Thus, we explain the MNE's ownership with the reversed signs of the original regression. In the second stage, we implement the censored and truncated maximum likelihood estimations (MLE). If we measure the threshold by an MNE's ownership, the estimation is MLE left-censored at 10% and right-truncated at 100% for jointly owned foreign affiliates.

Truncation refers to the points at which observations are eliminated, and censoring marks the upper or lower bound of observable figures. In the data of jointly owned foreign affiliates, 10% is the observable lower bound, but 100% is the point at which observations are not available by the definition of partial ownership.

Here, censoring at 10% is an artifact of data collection: having 10% or more of foreign ownership means that the firm possesses a foreign direct investment (FDI) according to

statistics. In contrast, truncation or censoring at 100% has behavioral implications. At 100%, ownership is at its natural limit, and observations are not actually censored (or scaled down) at 100%.

In our statistics, we know that there is a dichotomy between the 100%-owned firms and the less than 100%-owned ones. Therefore, we analyze this MLE using the inverse Mill's ratio of the probit estimation. This is due to the possibility that some determinants for the options of joint ownership might be dependent on the choices for equity structure. If the outcome of the equity structure in joint ownership is determined by the likelihood to choose joint ownership, the Mill's ratio has a significant coefficient.

This method, unlike the tobit estimation, allows the coefficients of an explanatory variable to have different signs in the probit and the MLE. Lin and Schmidt (1984) present the following example with the age of a building and the amount of loss due to fire. An older building is more likely to burn, but the market value of a burned building is lower if it is older. In this example, age has a positive effect on the selection of observation but a negative effect on the reported loss of value.

Similarly, the explanatory variable that we use might have different effects on the probability of joint ownership and on the ownership percentage by local investors.

We consider a model with two latent variables, y^*_{2i} and y^*_{1i}, which linearly depend on observable explanatory variables, X_{1i} and X_{2i}, respectively.[20]

$$\begin{aligned} y^*_{1i} &= \beta_1' X_{1i} + \epsilon_{1i} \\ y^*_{2i} &= \beta_2' X_{2i} + \epsilon_{2i} \text{ where } (\epsilon_{1i},\epsilon_{2i}) \tilde{} N\left(0, \begin{bmatrix} 1 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{bmatrix}\right) \end{aligned}$$

where the observation of y_{1i}, y_{2i} and y^*_{1i}, y^*_{2i} are in the following relation.

$$\begin{aligned} y_{1i} &= 1 \text{ if } y^*_{1i} > 0 \\ y_{1i} &= 0 \text{ if } y^*_{1i} \leq 0 \end{aligned}$$

and

$$\begin{aligned} y_{2i} &= y^*_{2i} \text{ if } y_{1i} = 1 \\ y_{2i} &= 0 \text{ if } y_{1i} = 0 \end{aligned}$$

If $y_{1i} = 1$ (participation of local investors), we then observe the equity shares of local investors (the counterpart to MNEs) as $y_{2i} = y^*_{2i}$. When we use only these selected values of

[20] We use the normalization of $\sigma_1^2 = 1$, since only the sign of y^*_{1i} is observed.

y_{2i}, we take into account the effect of the selection using the Mill's ratio of λ, defined below. We compute $\hat{\lambda} = \psi(\hat{\beta_1}'X_{1i})/\Psi(\hat{\beta_1}'X_{1i})$ from the probit regression of y_{1i} for all observations.

$$\begin{aligned} E[y_2|X_1, X_2, y_1^*] &= E[\beta_2'X_{2i} + \epsilon_2|\beta_1'X_{1i} + \epsilon_1 > 0] \\ &= \beta_2'X_{2i} + E[\epsilon_2|\epsilon_1 > -\beta_1'X_{1i}] \\ &= \beta_2'X_{2i} + E[(\sigma_{12}\epsilon_1 + \xi)|\epsilon_1 > -\beta_1'X_{1i}] \\ &= \beta_2'X_{2i} + \sigma_{12}E[\epsilon_1|\epsilon_1 > -\beta_1'X_{1i}] \\ &= \beta_2'X_{2i} + \sigma_{12}\psi(-\beta_1'X_{1i})/[1 - \Psi(\beta_1'X_{1i})] \\ &= \beta_2'X_{2i} + \sigma_{12}\psi(\beta_1'X_{1i})/\Psi(\beta_1'X_{1i}) \\ &= \beta_2'X_{2i} + \sigma_{12}\lambda \end{aligned} \tag{3.3}$$

The next step is to build a regression model using only the selected record.

$$y_{2i} = \beta_2'X_{2i} + \sigma_{12}\hat{\lambda}_i + \upsilon_i$$

Lin and Schmidt (1984) show the following likelihood ratio statistic for the censored (tobit) and the truncated regression with the Mill's ratio.

$$\ln \mathfrak{L} = -2[\ln \mathfrak{L}_{\mathfrak{t}} - (\ln \mathfrak{L}_{\mathfrak{p}} + \ln \mathfrak{L}_{\mathfrak{tr}})]$$

where,

$\ln \mathfrak{L}_{\mathfrak{t}}$: log likelihood for the Tobit model, with the same coefficients

$\ln \mathfrak{L}_{\mathfrak{p}}$: log likelihood for the Probit model, fit separately

$\ln \mathfrak{L}_{\mathfrak{tr}}$: log likelihood for the Truncated regression model, fit separately

and each likelihood function is given as follows, where $d_i = 1$ if $y_{2i} > 0$, and $d_i = 0$ if $y_{2i} = 0$.

$$\begin{aligned} \ln \mathfrak{L}_{\mathfrak{t}} &= \sum_{i=1}^{n}\left[d_i(-\frac{1}{2}\ln 2\pi\sigma_2^2 - \frac{(y_{2i} - \beta_2'X_{2i})^2}{2\sigma_2^2}) + (1 - d_i)\ln(1 - \Psi[\frac{\beta_2'X_{2i}}{\sigma_2}])\right] \\ \ln \mathfrak{L}_{\mathfrak{p}} &= \sum_{i=1}^{n}\left[y_{1i} \times \log \Psi[\frac{\beta_1'X_{1i}}{\sigma_1}] + (1 - y_{1i}) \times \log(1 - \Psi[\frac{\beta_1'X_{1i}}{\sigma_1}])\right] \\ \ln \mathfrak{L}_{\mathfrak{tr}} &= \sum_{i=1}^{n}\left[-\frac{1}{2}\ln 2\pi\sigma_2^2 - \frac{(y_{2i} - \beta_2'X_{2i})^2}{2\sigma_2^2} - \ln \Psi[\frac{\beta_2'X_{2i}}{\sigma_2}]\right] \end{aligned}$$

In the tables, we compare two estimations for each MLE. One includes the Mill's ratio as a regressor, and the other is the censored and truncated MLE without the Mill's ratio.

3.4.3 Results

We show the probit regression for the likelihood of joint ownership in Table 3.6 and 3.7 with robust standard errors in parentheses. Table 3.6 shows the results of Japanese-owned foreign affiliates in all 7 Asian countries (China, ASEAN, and the NIES), and Table 3.7 shows the results of 4 developing Asian countries (China and ASEAN).

We here try to determine what motivates a Japanese multinational firm's choice of organizational forms. We also compare the difference in the type of operation. Therefore, we investigate the sample of all manufacturing foreign affiliates, the affiliates for export platforms, and affiliates for local sales.

In Tables 3.6 and 3.7, the first three columns (1)-(3) show the results using the database of foreign affiliates (Data A). The next three columns (4)-(6) show the results using the database of affiliates and their parent firms (Data B). With the latter combined database, we are able to add explanatory variables for our questions. However, we have a smaller sample size than that in the analysis using a single database, since the two statistics do not perfectly connect an affiliate to its parent.

In our analysis, we primarily focus on the following viewpoints: (1) whether or not either a required knowledge or an expected local ability is a factor to define an organizational form, (2) how influential these two characteristics are in comparison to other variables, and (3) what the differences are between the vertical FDI and the horizontal FDI in the organizational choice.

We find that a preceding FDI experience (or acquired knowledge) in a host economy is a significant inducement to an MNE to choose full integration of a new affiliate, instead of joint-ownership. This factor is also estimated as one of the most influential determinants to explain the organizational choice in our analysis, and the results are significant at 1% level throughout columns (1)-(6). Column (1) in Table 3.6 shows that an MNE which has done FDI in the host country before is 46.8% less likely to be associated with the joint ownership for its next entry than an MNE without such experience. [21] This makes sense if the acquired knowledge in the host country lowers the expected marginal benefit of having a local partner as a provider of location-specific know-how.

Comparing the effects in (2) and (3), the inducement to choose full-integration is stronger when an MNE is setting up an affiliate to access local markets. The coefficient for full-integration is -0.560 (56.0% less likely to be jointly owned) in (3), which is more influential

[21] The marginal probability has the same sign as the coefficient, and the probability increases as the coefficient increases.

	Data A (Statistics of Affiliates)			Data B (Statistics of Affiliates and Parents)		
	ASEAN, China, NIES			ASEAN, China, NIES		
Dependent Variable	All Manufacturing	Export Platform (vertical FDI)	Local Sales (horizontal FDI)	All Manufacturing	Export Platform (vertical FDI)	Local Sales (horizontal FDI)
1: Joint Ownership	Probit	Probit	Probit	Probit	Probit	Probit
0: Full-Integration	Affiliates	Affiliates	Affiliates	Affiliate and Parents	Affiliate and Parents	Affiliate and Parents
	(1)	(2)	(3)	(4)	(5)	(6)
Acquired Local Knowledge (inversely related to λ)						
Preceding FDI at Host country	-0.468*** (0.092)	-0.421*** (0.138)	-0.560*** (0.128)	-0.528*** (0.106)	-0.435*** (0.157)	-0.621*** (0.149)
Preceding FDI at other Asian countries	-0.077 (0.056)	-0.128 (0.082)	-0.038 (0.080)	0.050 (0.067)	-0.046 (0.100)	0.137 (0.093)
Expected Local Ability (denoted as bar-θ)						
Local Procurement Ratio by Incumbent Affiliates	0.205* (0.110)	0.337 (0.219)	0.088 (0.200)	0.104 (0.174)	0.258 (0.275)	-0.057 (0.240)
Restriction on Foreign Investors						
Restriction for local sales	0.190*** (0.071)		0.183*** (0.072)	0.159** (0.078)		0.168** (0.080)
Restriction for export processing	-0.297*** (0.074)	-0.045 (0.629)		-0.256*** (0.081)	-0.572 (0.938)	
Parent Firms						
Size (ln_number of employees)	0.161*** (0.017)	0.105*** (0.024)	0.201*** (0.025)	0.094*** (0.023)	0.043 (0.034)	0.132*** (0.034)
R&D Intensity (R&D spending/Sales)				0.701 (1.271)	0.405 (2.013)	1.431 (1.727)
Capital Intensity (denoted as β)				-0.217 (0.585)	-0.254 (0.941)	0.592 (0.802)
Markup (denoted as $1/\alpha$)				0.767 (0.664)	1.515 (1.001)	-0.053 (0.932)
Constant term	-0.024 (0.385)	0.039 (0.660)	-0.965 (0.968)	-0.826 (0.647)	0.519 (1.025)	-0.652 (0.595)
Industry Dummies (Parent Firms)	No	No	No	Yes	Yes	Yes
Industry Dummies (Affiliates)	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	4615	1206	3409	3434	862	2572
0 (Full-Integration)	1893	659	1234	1268	425	843
1 (Joint-Ownership)	2722	547	2175	2166	437	1729
Wald Chi(2)	273.7	137.85	188.1	279.1	107.58	195.6
Prob.>chi2	0	0	0	0	0	0

: Standard errors in parenthesis. * significant at 10%, ** significant at 5%, *** significant at 1%.

: Source of Data A is the *Basic Survey of Overseas Business Activities.*

Table 3.6: [ASEAN, China, and NIES] Likelihood of Joint Ownership

	Data A (Statistics of Affiliates)			Data B (Statistics of Affiliates and Parents)		
	ASEAN, China			ASEAN, China		
Dependent Variable	All Manufacturing	Export Platform (vertical FDI)	Local Sales (horizontal FDI)	All Manufacturing	Export Platform (vertical FDI)	Local Sales (horizontal FDI)
1: Joint Ownership	Probit	Probit	Probit	Probit	Probit	Probit
0: Full-Integration	Affiliates	Affiliates	Affiliates	Affiliate and Parents	Affiliate and Parents	Affiliate and Parents
	(1)	(2)	(3)	(4)	(5)	(6)
Acquired Local Knowledge (inversely related to λ)						
Preceding FDI at Host country	-0.557*** (0.110)	-0.540*** (0.157)	-0.669*** (0.163)	-0.670*** (0.126)	-0.635*** (0.178)	-0.745*** (0.189)
Preceding FDI at other Asian countries	-0.097 (0.070)	-0.114 (0.096)	-0.120 (0.106)	0.019 (0.084)	-0.018 (0.120)	0.048 (0.126)
Expected Local Ability (denoted as bar-θ)						
Local Procurement Ratio by Incumbent Affiliates	0.263* (0.141)	0.351 (0.267)	0.072 (0.275)	0.263 (0.174)	0.267 (0.346)	0.271 (0.211)
Restriction on Foreign Investors						
Restriction for local sales	0.334*** (0.090)		0.316*** (0.091)	0.306*** (0.100)		0.304*** (0.101)
Restriction for export processing	-0.320*** (0.089)	-0.355** (0.171)		-0.242*** (0.097)	-1.249 (1.029)	
Parent Firms						
Size (ln_number of employees)	0.206*** (0.021)	0.125*** (0.028)	0.287*** (0.033)	0.136*** (0.029)	0.059 (0.040)	0.098 (0.026)
R&D Intensity (R&D spending/Sales)				1.260 (1.683)	0.955 (2.472)	0.471** (0.200)
Capital Intensity (denoted as β)				-0.968 (0.730)	-1.121 (1.107)	-0.056 (1.074)
Markup (denoted as 1/α)				-0.117 (0.838)	0.248 (1.214)	-0.453 (1.244)
Constant term	-0.981 (0.444)	0.471 (0.696)	-1.168 (0.660)	0.457 (0.573)	0.699 (1.172)	0.104 (0.774)
Industry Dummies (Parent Firms)	No	No	No	Yes	Yes	Yes
Industry Dummies (Affiliates)	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	3224	862	2362	2395	617	1778
0 (Full-Integration)	1078	419	659	698	264	434
1 (Joint-Ownership)	2146	443	1703	1697	353	1344
Wald Chi(2)	190.07	83.5	126.79	144.89	60.75	77.31
Prob.>chi2	0	0	0	0	0	0

: Standard errors in parenthesis. * significant at 10%, ** significant at 5%, *** significant at 1%.

: Source of Data B is the *Basic Survey of Overseas Business Activities,* and *Basic Survey of Japanese Business Structure and Activities.*

Table 3.7: [ASEAN, and China] Likelihood of Joint Ownership

than a coefficient of -0.421 (42.1% less likely to be jointly owned) in (2) when an MNE is setting up an affiliate for export platforms. A similar difference is given by comparing columns (5) and (6). The horizontal type FDI for firms to access local markets is influenced by the available local knowledge. Therefore, an MNE values its preceding experience with the host economy, if any, when it is starting the horizontal FDI rather than a case when it is starting the vertical type FDI.

However, the experience of FDI crucial for a new entry is limited to the one acquired in the same host country. The results show that an operation in other Asian countries (excluding the host economy) does not affect the propensity to choose full-integration or joint ownership. The results in columns (1)-(6) do not show any significant results. We also find that the local procurement ratio by incumbent firms, after controlling the industry fixed effects, is not necessarily a significant factor for organizational choice. Therefore, we may conclude that firms decide organizational form based primarily on their own historical background rather than the industry-level factors given in a local economy.

In addition, we suggest that local political restrictions may significantly influence the organizational choice, although the effects differ by the type of FDI. (We consider the political treatment of foreign investors through taxes, permissions, limit of ownership, and local content requirement.) According to column (3) in Table 3.6, if there exists a restrictive policy on foreign investors for local sales, a firm is estimated to have a more likely choice of joint ownership by a coefficient of 0.183 (18.3% more likely to be jointly owned). In contrast, according to column (2), the coefficient is not significant and a restrictive policy on FDI for export platforms does not seem to induce joint ownership. The results are similar when we compare columns (5) and (6). We then infer that political treatments work to encourage joint ownership, but the effects are not influential as a firm-level choice based on acquired local knowledge.

We further comment on the effects by the characteristics of parent firms or parent industries. Firstly, the size of an MNE is related to the organizational form of a foreign affiliate. The larger the size of an MNE, the higher the likelihood of joint-ownership of an affiliate is. The effects are specifically strong when a foreign affiliate seeks an access to local markets. This may be related to some diversification strategies by large-sized MNEs. Next, let us comment on explanatory variables tested in columns (4)-(6), where we use the statistics connecting affiliates and their parents (Data B). We test some factors emphasized in previous studies. [22] The capital intensity and the markup are ambiguous factors for

[22]Theoretically, the "transaction cost approach" explains that firms are likely to integrate if their transaction costs with another party are high due to their specificity in factors of production. According to

joint ownership in our empirical analysis. An MNE's R&D intensity is not significant, either. In contrast to previous studies, we are unable to provide a strong inference for these explanatory factors.

In Table 3.7, we extract the sample of affiliates in 4 developing countries, to clarify the difference of organizational choices compared to the choices taken in industrialized economies. Similar to Table 3.6, the preceding experience in FDI shifts an affiliate to be fully integrated. For example, it is 55.7% less likely to be associated with joint ownership in column (1). The local political restrictions for horizontal FDI shift an affiliate to be jointly-owned. Column (3) shows that restrictions promote joint ownership by 31.6%. But other parameters do not show the consistent significance of their effects.

We next discuss the factors to explain the allocation of ownership. Table 3.8 and Table 3.9 shows the results of the maximum likelihood estimation we propose in the previous section. The dependent variables are the ownership percentage of MNEs.[23] One of the important discussions is the regression with the Mill's λ. If the coefficients of the Mill's λ (from the first-stage probit) are significant, the error terms in the probit and the ML regression are correlated. If not significant, the error terms are not correlated and thus the ML estimation gives consistent estimation of coefficients for other regressors. In Table 3.8 and 3.9, we present two columns for each classification of the sample. The first column shows the result with the Mill's λ as one of the regressors. The second column is the result without it.[24]

Our results in Table 3.8 and 3.9 do not show the significance of the Mill's λ. Therefore, we suggest that the choice of corporate structure and the choice of specific ownership percentage in joint ownership are regarded as separable choices. However, from the two columns, we also observe that $\hat{\sigma}$, the estimate of σ (the standard deviation of the ownership percentage), becomes smaller by including the Mill's λ into a regression. This also suggests that the Mill's λ explains the variation of the dependent variables and provides a better fit for the regression model.

We then discuss the main findings. Firstly, we find that a preceding FDI in the host

this view, the higher the R&D intensity, the greater the ownership allocation to an MNE. The "property rights approach" notes that ownership goes to a party whose factors of production are intensively used. Therefore, higher capital intensity leads to greater ownership allocation of an MNE (the provider of capital).

[23] We originally use the ownership percentage by local investors as the dependent variable in the regression. We then show tables indicating the results of the ownership by MNEs by converting the signs of the coefficients.

[24] The difference in the number of observation comes from the availability of the statistics of the parent firms' size of employment.

Data A (Affiliates)	**ASEAN, China, NIES**					
	All Manufacturing		Export Platform (vertical FDI)		Local Sales (horizontal FDI)	
Dependent Variable	Affiliates		Affiliates		Affiliates	
Ownership Percentage in Joint Ownership by Multinational Firms	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated
	(1)	(2)	(3)	(4)	(5)	(6)
Acquired Local Knowledge (inversely related to λ)						
Preceding FDI at Host country	0.168*** (0.041)	0.181*** (0.040)	0.197*** (0.097)	0.146*** (0.043)	0.172*** (0.043)	0.189*** (0.04)
Preceding FDI at other Asian countries	-0.012 (0.017)	-0.017 (0.018)	-0.028 (0.040)	-0.066 (0.05)	0.014 (0.018)	0.007 (0.018)
Expected Local Ability (denoted as bar-θ)						
Local Procurement Ratio by Incumbent Affiliates	-0.017 (0.045)	-0.03 (0.046)	-0.325** (0.125)	-0.303** (0.144)	0.042 (0.045)	0.033 (0.045)
Inverse Mill's Lambda (from Probit regression)	0.038 (0.071)		-0.368 (0.205)		0.119 (0.068)	
Restriction on Foreign Investors						
Restriction for local sales	-0.178*** (0.036)	-0.486*** (0.131)			-0.064 (0.09)	-0.011 (0.018)
Restriction for export processing	0.209*** (0.036)	0.210*** (0.035)	0.285 (0.264)	-0.038 (0.235)		
Sigma	0.260*** (0.010)	0.284*** (0.012)	0.301*** (0.027)	0.368*** (0.041)	0.229*** (0.01)	0.242*** (0.01)
Industry Dummies (Parent Firms)	No	No	No	No	No	No
Industry Dummies (Affiliates)	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	2722	3377	547	709	2175	2668
Pseudo-Log Likelihood	361.71	390.51	154.96	163.10	264.53	281.60

: Standard errors in parenthesis. * significant at 10%, ** significant at 5%, *** significant at 1%.

: Source of Data A is the *Basic Survey of Overseas Business Activities.*

Table 3.8: [ASEAN, China, and NIES] Ownership by MNEs in Joint Ownership (Data A)

Data A (Affiliates)	**ASEAN, China**					
Dependent Variable	All Manufacturing		Export Platform (vertical FDI)		Local Sales (horizontal FDI)	
	Affiliates		Affiliates		Affiliates	
Ownership Percentage in Joint Ownership by Multinational Firms	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated
	(1)	(2)	(3)	(4)	(5)	(6)
Acquired Local Knowledge (inversely related to λ)						
Preceding FDI at Host country	0.127***	0.148***	0.156*	0.170***	0.131***	0.152***
	(0.039)	(0.037)	(0.086)	(0.045)	(0.041)	(0.038)
Preceding FDI at other Asian countries	-0.002	-0.008	-0.029	-0.053	0.025	0.018
	(0.017)	(0.018)	(0.034)	(0.041)	(0.018)	(0.065)
Expected Local Ability (denoted as bar-θ)						
Local Procurement Ratio by Incumbent Affiliates	0.036	0.003	-0.210*	-0.178	0.047	0.065
	(0.047)	(0.047)	(0.111)	(0.116)	(0.044)	(0.049)
Inverse Mill's Lambda (from Probit regression)	0.063		-0.204		-0.038	
	(0.061)		(0.161)		(0.068)	
Restriction on Foreign Investors						
Restriction for local sales	-0.135	-0.029			-0.121	-0.025
	(0.092)	(0.023)			(0.085)	(0.019)
Restriction for export processing	0.239***	0.226***	0.259	0.100		
	(0.037)	(0.035)	(0.195)	(0.19)		
Sigma	0.238	0.258	0.258**	0.311**	0.213**	0.225**
	(0.009)	(0.01)	(0.02)	(0.029)	(0.009)	(0.01)
Industry Dummies (Parent Firms)	No	No	No	No	No	No
Industry Dummies (Affiliates)	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	2146	2675	443	583	1703	2092
Pseudo-Log Likelihood	313.64	333.22	137.59	141.27	223.41	233.76

: Standard errors in parenthesis. * significant at 10%, ** significant at 5%, *** significant at 1%.

: Source of Data A is the *Basic Survey of Overseas Business Activities.*

Table 3.9: [ASEAN, and China] Ownership by MNEs in Joint Ownership (Data A)

economy shows a positive effect for a greater ownership percentage by an MNE. When an MNE with experience of FDI happens to choose joint ownership for its affiliate, the resulting ownership percentage is expected to be higher than that of an MNE without such experience. Column (1) in Table 3.8 shows that MNEs with local knowledge have 16.8% higher percentage of ownership on average than MNEs without the experience. For affiliates in developing economies (China and ASEAN), MNEs ownership percentage by firms with local experiences is 12.7% higher on average, from column (1) in Table 3.9. Here, only the experience of the host country matters, and the experience in other Asian countries matters less. In addition, we add a remark about the difference between a vertical FDI and a horizontal FDI. Comparing column (3) and (5) in Table 3.8 and 3.9, a MNE is more likely to hold a higher ownership share in a vertical FDI, when it has a preceding experience in FDI.

Secondly, in the vertical FDI, the local procurement ratio shows negative coefficients in column (3). A higher local procurement by incumbent firms then suggests a delegation of ownership by an MNE when a jointly-owned affiliate is to operate as an export platform. According to column (3) in Table 3.8, when a firm buys intermediate inputs completely locally, an MNE tends to have 32.5% less ownership (with the significance at 5% level) than a firm which completely depends on non-local inputs. However, in the horizontal FDI for firms seeking local markets, we do not observe such influence.[25] Then we may need to investigate other aspects of their businesses to discuss the determinants of ownership further.

Thirdly, we find that the political restrictions do not show significant results for ownership in either affiliates of vertical FDI or horizontal FDI. Significant signs appear in columns (1) and (2) for the whole sample size, but not for the separated sample by the types of FDI, in columns (3)-(6) in Table 3.8 and 3.9. These results suggest that some political factors are influential for the organizational choice (as we see in Table 3.6 and 3.7), but not necessarily for the ownership percentage.

In addition to the three main findings in Table 3.8 and 3.9 , we add supplemental comments on other variables used. The results are shown in Table 3.10 and Table 3.11 for the sample connecting affiliates and their parent firms (Data B). Here, the additional variables are R&D intensity (i.e. R&D to sales), capital intensity, and markup in final goods market. Now R&D intensity of an MNE is a factor to promote a higher share of

[25] Local purchase activity may face various market-related or policy-related constraints, when it goes along with local sales. Therefore, in horizontal FDI, procurement does not necessarily capture the ability of local firms or industries.

ownership, though it is not a significant factor to induce full-integration. The markup in the final consumers' market shows a significant sign in columns (1) and (2), and it might imply that an MNE has an incentive to choose a higher ownership percentage when the profitability in final markets is greater.

3.5 Conclusions

In this paper, we examine why a foreign affiliate could be either a fully owned affiliate of a parent firm (MNE, i.e., multinational enterprise) or a jointly owned affiliate, in which both parents and local investors participate as the owners. We also investigate what factors will persuade owners to accumulate equity shares of their sides when an affiliate is jointly owned. Research on the latter question is particularly scarce.

To correct this deficiency, we contribute to the existing literature using a large sample of firms and using detailed firm-level information. We also show the relevance of our model to the empirical results.

Specifically, we investigate the data and construct regressions in the following way. First, we classify foreign affiliates by their modes of operation at the setup. We then compare the determinants of ownership. Second, we avoid the problem of endogeneity by constructing exogenous variables. We focus on the activities by the hosting local industry and parent firm prior to a new FDI project. Third, we compare the significance and strength of political treatment by local governments with the effects of economic factors at home and at host industries. We then discuss how the recent FDI projects are organized.

We report the following findings. First, we note that the likelihood for joint ownership significantly decreases when an MNE has access to local information. Second, we find that, when the local absorptive capacity of manufacturing is high in an export processing activity, MNE delegates control to local parties of jointly owned affiliates. Third, when we compare the influence of political treatments with that of prior experience of FDI, the latter has a more significant effects on organizational choices and on ownership percentage. This shows that an enforcement mechanism by local government is not the only factor that explains the ownership determination by foreign investors.

There are still weaknesses, however, in our research. First, we set up theoretical arguments that are applicable to a very specific situation: foreign direct investment operating in developing economies for manufacturing. We then put specific emphasis on the location and activity of foreign affiliates in the statistics to keep the relevance of the data to the theoretical specifications. We next try to conduct an extensive analysis with more generalized

settings in our theoretical specifications.

Secondly, we only observe the number of affiliates doing FDI. We are not able to count local firms undertaking outsourcing contracts from foreign investors in a comparable way.[26] We, instead, consider variables that affect the participation of outsourcing and incorporate them in the regression analysis. The results are, however, still ambiguous.

Therefore, we need to gain more insight into the motivation behind the corporate structures and organizational and financial composition that multinational firms choose. These will be the subjects of future research.

3.A Appendix: Correlation Matrices

[26] Tomiura (2005) tests the propositions of Antras (2003) for choices between foreign outsourcing and FDI. However, the Japanese database is not compatible with ours. Tomiura used cross-sectional data, and the location (country) of the contractors was not available.

Data B (Affiliates and Parents)	ASEAN, China, NIES					
	All Manufacturing		Export Platform (vertical FDI)		Local Sales (horizontal FDI)	
Dependent Variable	Affiliate and Parents		Affiliate and Parents		Affiliate and Parents	
Ownership Percentage in Joint Ownership by Multinational Firms	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated
	(1)	(2)	(3)	(4)	(5)	(6)
Acquired Local Knowledge (inversely related to λ)						
Preceding FDI at Host country	0.182*** (0.062)	0.201*** (0.051)	0.367** (0.173)	0.127** (0.049)	0.188** (0.061)	0.265** (0.054)
Preceding FDI at other Asian countries	0.002 (0.022)	-0.002 (0.021)	0.002 (0.048)	0.005 (0.049)	0.032 (0.023)	0.009 (0.021)
Expected Local Ability (denoted as bar-θ)						
Local Procurement Ratio by Incumbent Affiliates	-0.034 (0.055)	-0.034 (0.055)	-0.503** (0.169)	-0.389** (0.156)	0.009 (0.056)	0.029 (0.055)
Inverse Mill's Lambda (from Probit regression)	0.066 (0.143)		-1.192 (0.599)		0.27 (0.153)	
Restriction on Foreign Investors						
Restriction for local sales	0.004 (0.027)	0.003 (0.026)			0.014 (0.026)	0.002 (0.024)
Restriction for export processing	0.194** (0.104)	0.217*** (0.039)	0.151 (0.303)	-0.394 (0.327)		
Parent Firms						
R&D Intensity (R&D spending/Sales)	0.711** (0.327)	0.644** (0.321)	-1.487 (1.106)	-0.369 (1.017)	0.77 (0.315)	0.629 (0.309)
Capital Intensity (denoted as β)	-0.259 (0.203)	-0.25 (0.201)	-0.68 (0.463)	-0.817 (0.482)	-0.13 (0.196)	-0.171 (0.199)
Markup (denoted as 1/α)	0.595*** (0.232)	0.567*** (0.222)	-0.285 (0.587)	0.775 (0.531)	0.363 (0.244)	0.347 (0.245)
Sigma	0.270*** (0.013)	0.270*** (0.013)	0.311*** (0.034)	0.316*** (0.036)	0.235*** (0.011)	0.236*** (0.012)
Industry Dummies (Parent Firms)	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies (Affiliates)	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	2166	2166	437	437	1729	1729
Pseudo-Log Likelihood	283.60	283.47	132.06	128.89	206.21	203.31

: Standard errors in parenthesis. * significant at 10%, ** significant at 5%, *** significant at 1%.

: Source of Data B is the *Basic Survey of Overseas Business Activities,* and *Basic Survey of Japanese Business Structure and Activities.*

Table 3.10: [ASEAN, China, and NIES] Ownership by MNEs in Joint Ownership (Data B)

Data B (Affiliates and Parents)	**ASEAN, China**					
	All Manufacturing		Export Platform (vertical FDI)		Local Sales (horizontal FDI)	
Dependent Variable	Affiliate and Parents		Affiliate and Parents		Affiliate and Parents	
Ownership Percentage in Joint Ownership by Multinational Firms	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated	Censoed & Truncated with Mill's	Censoed & Truncated
	(1)	(2)	(3)	(4)	(5)	(6)
Acquired Local Knowledge (inversely related to λ)						
Preceding FDI at Host country	0.136***	0.148***	0.194	0.165	0.153***	0.209***
	(0.06)	(0.049)	(0.153)	(0.072)	(0.062)	(0.054)
Preceding FDI at other Asian countries	0.013	0.012	-0.001	0.008	0.027	0.016
	(0.021)	(0.021)	(0.04)	(0.04)	(0.023)	(0.022)
Expected Local Ability (denoted as bar-θ)						
Local Procurement Ratio by Incumbent Affiliates	0.022	0.022	-0.346**	-0.316**	0.074	0.091
	(0.057)	(0.057)	(0.129)	(0.122)	(0.062)	(0.062)
Inverse Mill's Lambda (from Probit regression)	0.034		-0.434		0.167	
	(0.118)		(0.362)		(0.107)	
Restriction on Foreign Investors						
Restriction for local sales	-0.085	-0.081			-0.012	-0.014
	(0.139)	(0.139)			(0.03)	(0.25)
Restriction for export processing	0.25	0.243	0.151	-0.055		
	(0.043)	(0.039)	(0.272)	(0.231)		
Parent Firms						
R&D Intensity (R&D spending/Sales)	-0.132	-0.196	-0.562	0.068	0.018	-0.39
	(0.439)	(0.393)	(0.928)	(0.832)	(0.452)	(0.398)
Capital Intensity (denoted as β)	-0.163	-0.145	-0.335	-0.579	-0.084	-0.048
	(0.209)	(0.2)	(0.409)	(0.357)	(0.214)	(0.213)
Markup (denoted as 1/α)	0.498**	0.495**	-0.076	0.011	0.502**	0.504**
	(0.225)	(0.224)	(0.414)	(0.405)	(0.213)	(0.21)
Sigma	0.246**	0.246**	0.257**	0.258**	0.220**	0.220**
	(0.012)	(0.012)	(0.023)	(0.023)	(0.011)	(0.011)
Industry Dummies (Parent Firms)	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies (Affiliates)	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observation	1697	1697	353	353	1344	1344
Pseudo-Log Likelihood	242.06	242.00	117.50	116.75	170.47	168.78

: Standard errors in parenthesis. * significant at 10%, ** significant at 5%, *** significant at 1%.

: Source of Data B is the *Basic Survey of Overseas Business Activities,* and *Basic Survey of Japanese Business Structure and Activities.*

Table 3.11: [ASEAN, and China] Ownership by MNEs in Joint Ownership (Data B)

ASEAN, China, NIES: Local Sales (horizontal)

(obs=3905) Foreign Affiliates	Ownership	Joint	Procurement	Host	Asia
MNE's Ownership	1				
1=Joint, 0=Full-integration	-0.764	1			
Local Procurement by Incumbe	-0.090	0.116	1		
Preceding FDI at Host (1=yes)	0.190	-0.181	-0.046	1	
Preceding FDI in Asia (1=yes)	-0.031	0.032	-0.037	-0.012	1

(obs=2572) Affiliates and Pare	Ownership	Joint	Procurement	Host	Asia	Capital	markup	Restriction	R&D	HQ-Size
MNE's Ownership	1									
1=Joint, 0=Full-integration	-0.785	1								
Local Procurement by Incumbe	-0.077	0.124	1							
Preceding FDI at Host (1=yes)	0.184	-0.169	-0.049	1						
Preceding FDI in Asia (1=yes)	0.017	-0.009	-0.019	0.012	1					
Capital Intensity	0.058	-0.058	0.103	0.017	0.078	1				
Markup	0.017	-0.002	0.124	0.043	0.079	0.244	1			
Ownership Restriction (1=yes)	-0.033	0.059	0.070	-0.064	-0.001	-0.023	0.048	1		
R&D Intensity (R&D/Sales)	0.016	0.015	-0.067	0.059	0.113	0.006	0.220	0.057	1	
ln_(MNE's # of employees)	-0.002	0.031	-0.089	0.072	0.177	0.016	-0.056	0.006	0.490	1

ASEAN, China: Local Sales (horizontal)

(obs=2751) Foreign Affiliates	Ownership	Joint	Procurement	Host	Asia
MNE's Ownership	1				
1=Joint, 0=Full-integration	-0.727	1			
Local Procurement by Incumbe	-0.048	0.073	1		
Preceding FDI at Host (1=yes)	0.203	-0.215	-0.054	1	
Preceding FDI in Asia (1=yes)	-0.020	0.028	-0.051	-0.023	1

(obs=1778) Affiliates and Pare	Ownership	Joint	Procurement	Host	Asia	Capital	markup	Restriction	R&D	HQ-Size
MNE's Ownership	1									
1=Joint, 0=Full-integration	-0.747	1								
Local Procurement by Incumbe	-0.022	0.068	1							
Preceding FDI at Host (1=yes)	0.222	-0.237	-0.058	1						
Preceding FDI in Asia (1=yes)	0.028	-0.015	-0.009	0.022	1					
Capital Intensity	0.026	-0.017	0.145	0.021	0.117	1				
Markup	-0.009	0.024	0.186	0.075	0.084	0.251	1			
Ownership Restriction (1=yes)	0.013	0.029	0.071	-0.062	0.016	-0.031	0.084	1		
R&D Intensity (R&D/Sales)	-0.019	0.050	-0.078	0.043	0.104	0.006	0.178	0.057	1	
ln_(MNE's # of employees)	-0.033	0.071	-0.092	0.045	0.184	0.027	-0.063	0.011	0.525	1

Table 3.12: [Correlation Matrix] Foreign Affiliates for Export Processing

ASEAN, China, NIES: Export Processing (vertical)

(obs=1742) Foreign Affiliates	Ownership	Joint	Procurement	Host	Asia
MNE's Ownership	1				
1=Joint, 0=Full-integration	-0.745	1			
Local Procurement by Incumbe	-0.147	0.131	1		
Preceding FDI at Host (1=yes)	0.104	-0.101	-0.052	1	
Preceding FDI in Asia (1=yes)	-0.019	-0.005	-0.011	-0.018	1

(obs=863) Affiliates and Paren	Ownership	Joint	Procurement	Host	Asia	Capital	markup	Restriction	R&D	HQ-Size
MNE's Ownership	1									
1=Joint, 0=Full-integration	-0.729	1								
Local Procurement by Incumbe	-0.171	0.130	1							
Preceding FDI at Host (1=yes)	0.123	-0.111	-0.055	1						
Preceding FDI in Asia (1=yes)	0.073	-0.073	0.021	0.013	1					
Capital Intensity	-0.057	0.018	0.115	-0.017	-0.146	1				
Markup	-0.036	-0.001	0.084	-0.009	0.014	0.142	1			
Ownership Restriction (1=yes)	-0.056	0.098	0.133	0.012	0.012	0.074	-0.004	1		
R&D Intensity (R&D/Sales)	0.060	-0.062	-0.071	0.167	0.102	-0.108	0.137	0.075	1	
ln_(MNE's # of employees)	0.049	0.005	-0.044	0.128	0.184	-0.084	-0.055	0.079	0.499	1

ASEAN, China: Export Processing (vertical)

(obs=1107) Foreign Affiliates	Ownership	Joint	Procurement	Host	Asia
MNE's Ownership	1				
1=Joint, 0=Full-integration	-0.727	1			
Local Procurement by Incumbe	-0.120	0.071	1		
Preceding FDI at Host (1=yes)	0.155	-0.154	-0.061	1	
Preceding FDI in Asia (1=yes)	-0.030	-0.002	0.048	-0.014	1

(obs=618) Affiliates and Paren	Ownership	Joint	Procurement	Host	Asia	Capital	markup	Restriction	R&D	HQ-Size
MNE's Ownership	1									
1=Joint, 0=Full-integration	-0.720	1								
Local Procurement by Incumbe	-0.136	0.073	1							
Preceding FDI at Host (1=yes)	0.188	-0.186	-0.058	1						
Preceding FDI in Asia (1=yes)	0.078	-0.051	0.048	0.031	1					
Capital Intensity	0.012	-0.082	-0.005	-0.070	-0.127	1				
Markup	-0.055	0.013	0.097	0.007	0.016	0.188	1			
Ownership Restriction (1=yes)	-0.052	0.047	0.124	0.039	0.029	-0.077	0.014	1		
R&D Intensity (R&D/Sales)	0.050	-0.030	-0.042	0.198	0.098	-0.127	0.113	0.110	1	
ln_(MNE's # of employees)	0.047	0.014	-0.051	0.159	0.186	-0.139	-0.041	0.094	0.519	1

Table 3.13: [Correlation Matrix] Foreign Affiliates for Local Sales

Bibliography

[1] Aghion, P. and Tirole, J. (1997),“ Formal and Real Authority in Organizations,” *Journal of Political Economy*, v. 105, iss. 1, pp. 1-29.

[2] Aitken, B., Hanson, G., and Harrison, A. (1997),“Spillovers, Foreign Investment, and Export Behavior,” *Journal of International Economics*, August 1997, v. 43, iss. 1-2, pp. 103-32.

[3] Alvarez, R., and Gorg, H. (2005),“Multinationals and Plant Exit: Evidence from Chile,” IZA Discussion Paper No. 1611.

[4] Amiti, M. and Wei, S.J. (2006),“Service Offshoring and Productivity: Evidence from the United States,” NBER Working Paper, No.11926.

[5] Antras, P. (2003),“Firms, Contracts, and Trade Structure,” *Quarterly Journal of Economics*, November 2003, v. 118, iss. 4, pp. 1375-1418

[6] Asiedu, E.and Esfahani, H.(2001),“Ownership Structure in Foreign Direct Investment Projects,”*Review of Economics and Statistics*, Vol. 83, No. 4, Pages 647-662

[7] Aw, B.Y., Chen, X., and Roberts, M.(1997),“Firm-level Evidence on Productivity Differentials and Turnover in Taiwanese Manufacturing,” *Journal od Development Economics*, Vol.666, No.1, pp.51-86.

[8] Bartelsman, E. and Gray W. (2001), NBER Productivity Database, and NBER Technical Working Paper 205.

[9] Bernard, A., Jensen, B., and Schott, P. (2006),“Survival of the best fit: Exposure to low-wage countries and the (uneven) growth of U.S. manufacturing plants,” *Journal of International Economics*, Vol.68-1, pp.219-237.

[10] Blalock, G. (2001),“Technology from foreign direct investment: Strategic transfer through supply chains,” mimeo, UC Berkeley.

[11] Blyde, J., Kugler, M., and Stein, E. (2004),"Exporting vs Outsourcing by MNC Subsidiaries: Which determines FDI Spillovers?" mimeo.

[12] Bolton, P. and Dewatripont, M. (2005), *Contract Theory*, MIT Press.

[13] Cameron, A. and Trivedi, P. (2005), *Microeconometrics*, Cambridge University Press.

[14] Carkovic, M. and Levine, R. (2002),"Does Foreign Direct Investment Accelerate Economic growth?" University of Minnesota.

[15] Choi, C. and Beamish, P. (2004),"Split Management Control and International Joint Venture Performance," *Joirnal of International Business Studies*, Vol.35-3, pp.201-215.

[16] Clerides, S., Lach, S., and Tybout, J. (1998),"Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico, and Morocco," *Quarterly Journal of Economics*, Vol.113-3, pp.903-947.

[17] Desai, M., Foley, F., and Hines, J. (2005),"Foreign Direct Investment and Domestic Economic Activity," NBER Working Paper, No.11717.

[18] Desai, M., Foley, F., and Hines, J. (2002),"International Joint Ventures and the Boundaries of the Firm," NBER Working Papee No.9115.

[19] Development Bank of Japan (2005),"*The Data Bank of Corporate Finance (Kigyo Zaimu Data Bank, in Japanese)*"

[20] Feenstra, R. and Hanson, G. (2005),"Ownership and Control in Outsourcing to China: Estimating the Property-Rights Theory of the Firm," *Quarterly Journal of Economics*, 120, pp.729-761.

[21] Ferrett, B. (2004),"Foreign Direct Investment and Productivity Growth: A Survey of Theory," Research Paper Series 2004/15, University of Nottingham.

[22] Gattai, V. (2005)," From the theory of the firm to FDI and Internalization: Survey," FEEM Working Paper Series, 51.

[23] Girma, S., Greenaway, D., and Kneller, R. (2004),"Does Exporting Increase Productivity? A Microeconometric Analysis of Matched Firms," *Review of International Economics* Vol.12-5, pp.855-866.

[24] Good, D., Nadiri, M., and Sickles, R. (1997),"Index Number and Factor Demand Approaches to the Estimation of Productivity," *Handbook of Applied Econometrics: Vol.2. Microeconomics*, Basil Blackwell, pp.14-80.

[25] Grossman, S. and Hart, O. (1986),"The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy*, Vol.94-4, pp.691-719.

[26] Grossman, G. and Helpman, E. (2003),"Outsourcing versus FDI in Industry Equilibrium," *Journal of the European Economic Association*, April-May 2003, v. 1, iss. 2-3, pp. 317-27.

[27] Hanson, G., Mataloni, R., and Slaughter, M. (2003),"Vertical Specialization in Multilateral Firms," NBER Working Paper No.9723

[28] Hanson, G., Mataloni, R., and Slaughter, M. (2001),"Expansion Strategies of U.S. Multinational Firms," Brookings Trade Forum 2001, pp.245-pp.294.

[29] Hart, O. (1995), *Firms, Contracts, and Financial Structure,* Oxford University Press.

[30] Head, K. and Ries, J. (2005),"FDI as an Outcome of the Market for Corporate Control: theory and Evidence," mimeo, University of British Columbia.

[31] Head, K. and Ries, J. (2003),"Heterogeneity and the FDI versus Export Decision of Japanese Manufacturers," *Journal of the Japanese and International Economies*, Special Issue, Dec. 2003, v. 17, iss. 4, pp. 448-67

[32] Helpman, E., Melitz, M., and Yeaple, S. (2004),"Export versus FDI with Heterogeneous Firms," *American Economic Review*, Vol.94-1, pp.300-316.

[33] Helpman, E., (2006),"Trade, FDI, and the Organization of Firms" NBER Working Paper No.12091.

[34] Hijzen, A., Inui, T., and Todo, Y. (2007),"The effects of Multinational Production on Domestic Performance: Evidence from Japanese Firms," RIETI Discussion Paper Series 07-E-006.

[35] Ito, Tomiura, E., and Wakasugi, R. (2007),"Dissecting Offshore Outsourcing and R&D: A Survey of Japanese Manufacturing Firms," RIETI Discussion Paper Series 07-E-061.

[36] Ito, Y. (2007),"Choice for FDI and Post-FDI Productivity," RIETI Discussion Paper Series 07-E-049.

[37] Ito, T. and Krueger, A. (2004),"Governance, regulation, and privatization in the Asia-Pacific region," NBER-East Asia Seminar on Economics, vol. 12. Chicago and London: University of Chicago Press,

[38] Jensen, M. and Meckling, W. (1976),"Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics,* Volume 3, Issue 4, pp. 303-360.

[39] Keller, W. and Yeaple, S. (2003),"Multinational Enterprises, International Trade, and Productivity Growth: Firm-Level Evidence from the United States," NBER Working Papers No.9504

[40] Kim, G., Kwon, H., and Fukao, K. (2007),"Plant Turnover and Productivity Dynamics by Industry" RIETI Discussion Paper Series 07-J-022. (in Japanese)

[41] Kim, G. (2006),"Productivity Comparison-Analysis with DBJ for Japanese Listed Firms" mimeo

[42] Kimura, F. and Kiyota, K. (2007),"Exports, FDI, and Productivity: Dynamic Evidence from Japanese Firms," *Review of World Economics*, forthcoming

[43] Kiyota, K., Matsuura, T., Urata, S., and Wei, Y. (2005),"Reconsidering backward vertical linkage of foreign affiliates: Evidence from Japanese Multinationals," RIETI Discussion Paper 05-E019.

[44] Lafontaine, F. and Slade, M. (1998),"Incentive Contracting and the Franchise Decision," NBER Working Papers No.6544.

[45] Lafontaine, F. and Oxley, J. (2004),"International Franchising Practices in Mexico: Do Franchisers Customize Their Contracts?" *Journal of Economics and Management Strategy* , Special Issue Spring 2004, v. 13, iss. 1, pp. 95-123.

[46] Lai, H. and Zhu, C. (2004),"The Determinants of Bilateral Trade," *Canadian Journal of Economics*, May 2004, v. 37, iss. 2, pp. 459-83.

[47] Lin, T.F. and Schmidt, P. (1984),"A Test of the Tobit Specification Against an Alternative Suggested by Cragg" *The Review of Economics and Statistics*, Vol. 66, No. 1, pp. 174-177

[48] Ministry of Economy, Trade and Industry (METI), Japan. (2007), *The White Paper on International Economy and Trade*, forthcoming.

[49] Matsuura, T., Motohashi, K., and Fujisawa, M. (2007),"Productivity Dynamics of Machinery Manufacturing via Globalized Operation," RIETI Discussion Paper Series 07-J-015. (in Japanese)

[50] Matsuura, T., and Nagata, H. (2004),"Estimating size of overseas activities of Japanese MNEs and their effects on domestic employment (written in Japanese)," Keizai Toukei Kenkyu, Vol.33-4.

[51] Miller, R., Glen, J., Jaspersen, F., and Karmokolias, Y. (1997),"International Joint Ventures in Developing Countries," IFC Discussion Paper 29, International Finance Corporation.

[52] Nakamura, M. and Xie. J. (1998),"Non-verifiability, noncontractivity and ownership determination models in foreign direct investment, with an application to foreign operations in Japan," *International Journal of Industrial Organization*, Vol.16, pp.571-599.

[53] Navaretti, G. and Venables, A. (2004),"Multinational Firms in the World Economy " Princeton University Press.

[54] Navaretti, G. and Castellani (2004),"Investment Abroad and Performance at Home: Evidence from Italian Multinationals," CEPR Discussion Paper, No.4284.

[55] Naughton, B. (1996),"China's Emergence and Prospects as a Trading Nation," *Brooking Paper on Economic Activity*, 2, pp.273-344.

[56] Nocke, V. and Yeaple., S. (2005),"An assignment theory of Foreign Direct Investment," NBER Working Paper No.11003.

[57] Nunn, N. (2007),"Relationship-Specificity, Incomplete Contracts and the Pattern of Trade," *Quarterly Journal of Economics*, Vol. 122, No. 2, pp. 569-600.

[58] Pan, Y. (1996),"Influence on Foreign Equity Ownership Level in Joint Venture in China," *Joirnal of International Business Studies*, Vol.27-1, pp.1-26.

[59] Puga, D. and Trefler, D. (2002),"Knowledge Creation and Control in Organizations," CEPR Discussion Papers: 3516.

[60] Rauch, J.E. and Casella, A. (2003),"Overcoming Informational Barriers to International Resource Allocation: Prices and Ties," *Economic Journal*, v. 113, iss. 484, pp. 21-42.

[61] Rosenbaum, P. and Rubin, D. (1983),"The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika*, Vol.70-1, pp.41-55.

[62] Smarzynska, B. (2004),"Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages," *American Economic Review*, June 2004, v. 94, iss. 3, pp. 605-27.

[63] Smarzynska, B., Wei, S.J. (2000),"Corruption and Composition of Foreign Direct Investment: Firm-Level Evidence," NBER Working Paper No.7969.

[64] Spencer, B. (2005)," International Outsourcing and Incomplete Contracts," NBER Working Paper No.11418.

[65] Tomiura, E. (2007),"Foreign Outsourcing, Exporting, and FDI: A Productivity Comparison at the Firm Level," *Journal of International Economics*, forthcoming

[66] Tomiura, E. (2005),"Foreign outsourcing and firm-level characteristics: Evidence from Japanese manufacturers Evidence from Japanese Manufacturers," *Journal of the Japanese and International Economies*, Vol 19. pp.255-271

[67] Toyo Keizai Inc. Japan. (2005),"*The Database of Foreign Affiliates of Japanese Firms: A Comprehensive Dictionary (Kaigai Shinshutu Kigyo Souran, in Japanese).*"

[68] UNCTAD (2006),*The World Investment Report*, (http://www.unctad.org/en/docs/wir2006-en.pdf)