THE JAPANESE JOURNAL OF ADMINISTRATIVE SCIENCE

December, 2002 (Vol. 16, No. 2)

Edited by
THE JAPANESE ASSOCIATION OF ADMINISTRATIVE SCIENCE

CONTENTS

THE JAPANESE ASSOCIATION OF ADMINISTRATIVE SCIENCE
Department of Business Administration, Aichi-Gakuin University, 12 Araike, Iwasaki, Nisshin 470-0131, Aichi, Japan (Phone: +81-5617-3-1111 (Ex.380) ; Fax: +81-5617-4-2420)
E-mail: matsu@dpc.aichi-gakuin.ac.jp
Home Page: http://www.aichi-gakuin.ac.jp/~matsu/JAAS/

Japanese Journal of Administrative Science
Volume 16, No. 2, 2002, 163－177.
経営行動科学第16巻第2号，2002，163－177.

原　著

Effects of Ownership and Internalization Advantages on Performance: A Comparative Study of Japanese Manufacturing and Service Subsidiaries in the United States and Latin America

Cristian Vega-Céspedes[1] and Yasuo HOSHINO[2]
(University of Tsukuba)

This paper attempts to prove empirically that ownership and internalization advantages play a more important role than entry mode in explaining the attained performance of subsidiary companies. Two multivariate analysis techniques were applied to four samples selected by segregating manufacturing and service companies in the USA and in Latin America. While a direct effect of ownership and internalization advantages on performance was found, a relation between entry mode and performance is not evident.

INTRODUCTION

The entry mode selected to establish a subsidiary in a foreign country has been addressed by several past studies as one of the main determinants of the subsidiary performance. Those papers have usually approached the analysis from the transaction cost theory. The general conclusion has been that since levels of managerial control costs and resource commitment are lower for the greenfield entry mode, it will always outperform joint ventures and acquisitions. In other words, there is a direct relationship between the selected entry mode and the attained subsidiary performance, and consequently companies are expected to choose the greenfield entry mode. However, that decision is contingent on the resource availability, and a lack of resources can force the company to chose a different entry mode.

The current paper takes a different perspective towards the same matter. It approaches the analysis from Dunning's *eclectic paradigm* or OLI theory (ownership, location and internalization advantages). Basically, it states that it is not the entry mode that determines the subsidiary performance, but that both entry mode and performance are determined by the availability of resources. Using Dunning's terms, they are dependent on the possession of a number of advantages by the parent company and the subsidiary itself.

This approach poses two main research problems. The first one is that in order to apply statistical analysis measurable values are required. Nevertheless, concepts like advantage, ability, or even intangible assets are difficult to measure. In business research, the common practice has been to use a set of quantitative industry- or firm-level data, usually from financial statements or a database, to proxy for those concepts. However, there is no general agreement about what kind of data to take to proxy for a specific advantage. For example, the parent's R&D expenditure has been used to proxy for the amount of know-how transferred to the subsidiary (Hennart, 1991), for the possession of superior specialized knowledge or proprietary content (Gatignon & Anderson, 1988), for the bargaining power of a foreign parent (Lecraw, 1984) or even for product diversification capabilities.

1) Cristian Vega-Céspedes, Doctoral student of Finance and Management, Doctoral Program in Policy and Planning Sciences, University of Tsukuba, Japan
2) Corresponding author. Yasuo Hoshino, Professor of Finance and Management, Institute of Policy and Planning Sciences, University of Tsukuba, Japan

The second problem is data limitation. To carry out this kind of analysis, subsidiary level data is required, but there are very few databases containing recent information; the Toyo Keizai database being one of the best known. Unfortunately, since only a limited number of variables can be extracted from the database and thus they are related to the same underlying attributes, correlation is very likely, making it difficult to apply a statistical analysis, especially linear regression.

The current paper proposes to obtain multivariate data, and then, use factor analysis as a way for solving the problems presented above. This procedure can be used to explain the underlying attributes and relationships among the variables, based on the correlations among the independent variables. Additionally, factor analysis also offers a way to solve that correlation problem, and allows using scores derived from the original independent variables as the independent variables in regression analysis.

THEORETICAL BACKGROUND

When analyzing advantages, entry mode selection and performance, two different approaches are usually taken. The transaction cost model is used to explain the relation between the entry mode and the performance attained by the subsidiary, and the eclectic paradigm is used to explain how the advantages of the parent company determine the entry mode selection.

According to the transaction cost model the decision of entering a foreign market should be based on a trade-off between risk and return. Firms are expected to choose to enter a foreign market only if it offers a high risk-adjusted return on investment. From the transaction cost model, there are two characteristics of the entry mode whose costs will shape the decision taken by the firm. Those characteristics are the resource commitments and the degree of control.

Resource commitments refer to the *risk of exposing the firm's resources, the risk of resource overpayment* and *the costs of looking for a partner*. Management control refers to *type of control, number of control relationships, organizational cultural differences* and *maximization of synergies and minimization of redundancies in the new entity*.

The eclectic paradigm holds that there are three kinds of advantages that shape the determination of entering a foreign market, i.e., ownership advantages, internalization advantages and location advantages (Dunning, 1977/1980/1988). Ownership advantages refer to the possession of superior intangible and tangible assets (asset power), and skills, such as firm size, the ability to develop product differentiation, and multinational experience. Internalization advantages stand for the benefits of internalizing foreign activities, such as avoiding dissipation of knowledge, preventing deterioration in the quality of products and reducing the costs of writing and enforcing contracts. Location advantages refer to the particularities that make a place stand out from other places as a destination of foreign investments of a particular company.

HYPOTHESIS DEVELOPMENT

Based on the previously developed background, the hypotheses for the present study will be as follows:

Hypothesis 1: There is an underlying relationship among the financial indicators that separates them into different groups reflecting each of the ownership and internalization advantages of both the parent company and the subsidiary.

Hypothesis 2: The ownership and internalization advantages of the foreign parent firm and the subsidiary itself are positively associated with performance.

Hypothesis 3: Performance is not directly associated with entry mode.

Several studies hold that since the entry modes have specific resource and organizational control demands, the performance of a subsidiary will depend on the selected entry mode. However, while the present study agrees with the proposition that the entry modes are related to specific levels of resource commitment and levels of control, it does not correspond with the proposition that performance will be directly determined by the selected entry mode. The present study holds that both the selected entry mode and the performance attained by the subsidiary are a direct consequence of either the possession or the lack of advantages of the parent firm and the

subsidiary itself. Consequently, if a parent company possesses enough advantages to overcome the resource commitment and the managerial control costs, probably it will also be able to transfer enough capabilities to its subsidiary to make it generate high performance.

METHODOLOGY

Information Sources

The list of the information sources for the present research is as follow, a) *Japanese Overseas Investment: Listed by Countries, 2000* (Kaigai Shinshutsu Kigyou Souran: Kuni Betsu, 2000). This report covers all Japanese overseas investments undertaken by Japanese firms listed on the Japanese Stock Exchange (Tokyo, Osaka and Nagoya), as well as other major unlisted Japanese firms. The information in this report has been compiled from public available information and a survey of the top Japanese manager of each foreign subsidiary as of the end of the fiscal period 1999. The subsidiaries are listed by geographical location. Among the main data presented in the report, there is the top Japanese manager's assessment about his or her subsidiary financial performance. That assessment is categorized into three levels: loss, breakeven or gain. The industry classification to which the subsidiary belongs is also specified. b) *Japanese Overseas Investment: Listed by Firms, 2000* (Kaigai Shinshutsu Kigyou Souran: Kaisha Betsu, 2000). This is a counterpart of the previously mentioned report. The difference is that this one is sorted by parent company name instead of by geographical location. c) *Nikkei Annual Corporation Report 2000: Listed Companies* (Nikkei Kaisha Nenkan 2000: Joujou). Additional parent company information was collected from this report, which shows financial information as of the end of fiscal 1999 and 1998. d) *Nikkei Annual Corporation Report 2000: Unlisted Companies* (Nikkei Kaisha Nenkan 2000: Mijoujou). This is a counterpart of the previous report, but for unlisted companies.

Sample

Two geographical areas were chosen for the purpose of analysis: the USA and Latin America. This selection was made in order to apply a comparison between developed and developing countries. Locational advantages were partially controlled for by using only Japanese entries into those two markets. In addition, industry-specific effects were partially controlled for by carrying out the analysis separately for manufacturing and non-manufacturing industries. Since one of the main goals of this paper is to test for the relation between entry mode and performance, only those subsidiaries with performance assessment are taken into account in the analysis. The available information has to include the top Japanese manager's assessment about his subsidiary's financial performance into one of three possible categories: loss, break-even or gain.

The operational definition of the modes to be included in the analysis will be as follows, 1) A new venture is an entry that involved only one parent, which built and operationally equipped the plant. 2) An acquisition is an entry that involved only one parent and its plant and equipment were purchased from the previous owner. And, 3) a joint venture is an entry that involves more than one parent and its plant was built and operationally equipped by those parents (Woodcock, Beamish and Makino, 1994).

Even though there is no consensus on an equity criterion that should be used to distinguish a joint venture from a wholly owned subsidiary, the international business literature has used a 95% equity participation as a cut-off point to differentiate between them (Hennart, 1991; Gomes-Casseres, 1989). In all the joint ventures, one Japanese parent firm held at least 5% and no more than 95% of the joint venture equity. Although many previous studies have restricted their attention to subsidiaries with a single foreign parent, in the present study, subsidiaries with multiple parents are accepted. To take into account the existence of multiple-parents joint ventures, the special joint venture ownership classification developed by Makino & Beamish (1998) was applied. For the purpose of the present study, intrafirm joint ventures were considered as wholly-owned subsidiaries, due to the significant impact of the parent companies keiretsu relationship on the Japanese subsidiaries.

The manufacturing sample consists of 561 subsidiaries in the USA and 120 subsidiaries in Latin

America, and the service sample consists of 951 and 119 subsidiaries in the USA and Latin America respectively. The Latin America sample includes subsidiaries established in the following countries (sorted in descending order by number of subsidiaries in them): Brazil, Mexico, Panama, Chile, Argentina, Venezuela, Peru, Colombia, Ecuador, Guatemala, Costa Rica, El Salvador, Puerto Rico, Honduras, Bolivia, and Paraguay.

Dependent Variable

The dependent variable is a dichotomous dummy variable constructed on the basis of the top Japanese manager's assessment about his or her subsidiary financial performance. The variable will take one out of three values, corresponding to the possible categories of loss, breakeven or gain for the top Japanese manager's assessment about his subsidiary's financial performance.

Even though categorical performance measures have limitations, there are three main arguments that support this type of measure. 1) Where available, financial measures of performance are not directly comparable across industries and countries with different accounting systems and customs (Brown, Soybel and Stickney, 1994). 2) Because the survey respondent is the top Japanese manager in each subsidiary, it is expected that each manager reports the subsidiary performance from a similar reference point (Makino and Delios, 1996). And 3) managers' perceptions of performance have been demonstrated to be correlated with objective financial measures (Geringer and Herbert, 1991).

Independent Variables

Even though location advantages were not included as independent variables, it was considered that the samples represented markets that were homogenous enough to assume that using only Japanese entries into these two specific markets will control for the effects of location advantages.

Since the distribution of monetary values usually do not follow the normal distribution curve, the use of the *natural logarithm* of the quantity is applied, instead of the monetary value itself, to smooth the values and to bring them closer to the normal distribution (Kimura, 1989). The list of the independent variables used in the study will follow.

Variables taken from the *Japanese Overseas Investment: Listed by Countries, 2000* (Toyo Keizai Inc., 2000). 1) Subsidiary's experience in the host country (Makino and Delios, 1996; Hennart, 1991): The report includes the date in which the subsidiary is considered as officially created. The experience is calculated as the subsidiary's operational experience measured in years from that date. 2) Subsidiary's equity (Makino and Delios, 1996): The subsidiary's equity is reported either in the currency of the country where the subsidiary is located or in Japanese yen. The equity was translated into US dollars to work with a single currency. 3) Subsidiary's total number of local employees (Makino and Delios, 1996). 4) Subsidiary's intensity of Japanese employment (Makino and Delios, 1996): The ratio of Japanese expatriate managers to total employees for each subsidiary. 5) Subsidiary's total sales: As in the case of the subsidiary's equity, the amount of sales are reported either in the currency of the country where the subsidiary is located or in Japanese yen, and also were translated into US dollars. 6) Entry mode: A specification of the subsidiary initial ownership structure as Acquisition, Greenfield or Joint Venture. 7) Parent company's total number of subsidiaries in the host country. 8) Parent company's experience in the host country (Makino and Delios, 1996; Lecraw, 1984): The foreign parent's past local country experience is measured in years. It equals the experience of the subsidiary with longer permanence in the country.

Variables taken from the *Japanese Overseas Investment: Listed by Firms, 2000* (Kaigai Shinshutsu Kigyou Souran: Kaisha Betsu, 2000). 9) Parent company's total number of foreign subsidiaries (Cho, 1985; Wilson, 1980).

Variables taken from the *Nikkei Annual Corporation Report 2000* (Nihon Keizai Shimbunsha 2000). 10) Parent company's total assets (Yu and Ito, 1988; Lecraw, 1984). 11) Parent company's equity (Cho, 1985). Values in this report are presented in Japanese yen, consequently translation into other currency is not considered as necessary. 12) Parent company's total number of employees (Norburn and Birley,

1986). That includes the head offices and all the subsidiaries consolidated. Several measures are taken from this report to be used in the calculation of other variables, e.g., exportation sales (Kimura, 1989), total sales (Agarwal and Ramaswami, 1992), expenditure in R&D (Makino and Delios, 1996) and expenditure in advertisement. However, they are not included directly in the analysis since all of them proxy for the same characteristic, they are basically related to firm size.

Variables created by calculation. 13) Parent company's labor productivity (Siripaisalpipat and Hoshino, 2000): It is calculated as the parent company's total sales divided by the parent company's total number of employees, and it proxies for managerial know-how which helps enhance efficiency and productivity in the operations. It also measures the average productive output that each employee generates. 14) Parent company's export intensity (Makino and Delios, 1996; Lecraw, 1984). Multinational firms' foreign activities are usually measured by one of the following ratios: a) Export ratio; defined as the ratio of the foreign parent's export sales to total sales. b) Overseas ratio; construction firm's ratio of construction carried out overseas, and c) Trade ratio; trading firm's ratio of export, import, and offshore trading relative to total sales. For convenience, all these different measurements of foreign activities are referred as export ratios (He and Ng, 1998). 15) Parent company's R&D intensity (Makino and Delios, 1996; Hennart, 1991; Lecraw, 1984): It refers to the foreign parent's R&D expenditure as a percentage of total sales. 16) Parent company's advertisement intensity: It refers to the foreign parent's advertisement intensity as a percentage of total sales.

DATA ANALYSIS

Use of Factor Models to Remove Correlation

The correlation matrices of the four samples (Tables 1A through 1D) indicate that there is high correlation among the independent variables, which often produces instability in regression. In this paper, factor analysis has been used to solve this problem.

Factor analysis can be utilized to examine the underlying relationships for a large number of variables and to determine whether or not the information can be summarized in a smaller set of factor or components. Data reduction can be achieved by calculating scores for each underlying factor and substituting them for the original variables. Those factor scores can be taken as an entirely new set of variables, much smaller in number, to replace the original set of variables for inclusion as the independent variables in subsequent multivariate techniques, ranging from regression or discriminant analysis to cluster analysis (Hair et al., 1995). The factors are assumed to be uncorrelated with each other.

Testing the Adequacy of the Factor Analysis Model

Since one of the goals of factor analysis is to obtain factors that help explain correlations, it is necessary to ensure that the data matrix has sufficient correlations to justify the application of factor analysis. The three most common indicators of the strength of the relationship among variables are the following. 1) *Partial correlation coefficients*: SPSS does not directly provide the partial correlation coefficients, but instead it provides the negative value of the partial correlation coefficients, that is called the anti-image correlation matrix. 2) *Bartlett test of sphericity*: This is a statistical test for the presence of correlations among the variables. It is used to test the hypothesis that the correlation matrix is an identity matrix. 3) *Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA)*: This is an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients.

The anti-image correlation is not shown in the paper, but the coefficients are small enough as for considering the use of the factor model as appropriate. The results of the Bartlett test of sphericity, and of the overall Kaiser-Meyer-Olkin measure of sampling adequacy are shown in Table 2. The values of the Bartlett test are significant, consequently the hypothesis that the population correlation matrix is an identity is rejected, and it is concluded that the use of the factor model is appropriate. The values of the Kaiser-Meyer-Olkin measure are also large enough to support the appropriateness of the factor analysis

Table 1A : Correlation Matrix of Independent Variables USA - Manufacturing

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Parent Company's Global Number of Subsidiaries	1														
2 Parent Company's Export Intensity	0.331***	1													
3 Subsidiary's Equity	0.181*	−0.115	1												
4 Subsidiary's Total Number of Local Employees	0.344***	0.089	0.358***	1											
5 Parent Company's Total Assets	0.775***	0.118	0.276***	0.499***	1										
6 Parent Company's Equity	0.784***	0.114	0.221**	0.485***	0.946***	1									
7 Parent Company's Total Number of Employees	0.737***	0.138	0.289***	0.491***	0.945***	0.876***	1								
8 Parent Company's R&D Intensity	0.362***	0.346***	0.062	−0.070	0.281***	0.357***	0.234**	1							
9 Parent Company's Advertisement Intensity	0.329***	0.011	−0.027	0.015	0.287***	0.322***	0.182*	0.314***	1						
10 Parent Company's Labor productivity	0.413***	−0.219**	0.323***	0.334***	0.602***	0.540***	0.404***	0.046	0.250**	1					
11 Subsidiary's Experience in the Host Country	−0.032	−0.018	−0.064	0.043	−0.023	−0.044	0.021	0.135	−0.023	−0.040	1				
12 Subsidiary's Intensity of Japanese Employment	−0.170*	0.004	−0.215**	−0.678***	−0.221**	−0.232**	−0.157*	0.157*	−0.055	−0.242**	−0.010	1			
13 Parent Company's Number of Subsidiaries in the Host Country	0.822***	0.475***	0.145	0.241**	0.648***	0.652***	0.630***	0.404***	0.306***	0.322***	0.042	−0.148	1		
14 Parent Company's Experience in the Host Country	0.228**	0.199**	0.062	0.226**	0.083	0.142	0.080	0.183*	0.217**	0.157*	0.467***	−0.183*	0.429***	1	
15 Subsidiary's Total Sales	0.328***	0.082	0.344***	0.806***	0.537***	0.495***	0.519***	−0.020	0.159*	0.403***	0.087	−0.456***	0.260**	0.227**	1

Table 1B : Correlation Matrix of Independent Variables USA - Services

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Parent Company's Global Number of Subsidiaries	1														
2 Parent Company's Export Intensity	0.235***	1													
3 Subsidiary's Equity	0.213**	0.111	1												
4 Subsidiary's Total Number of Local Employees	0.189**	0.360***	0.358***	1											
5 Parent Company's Total Assets	0.705***	−0.074	0.295***	0.046	1										
6 Parent Company's Equity	0.664***	0.011	0.232***	0.219***	0.841***	1									
7 Parent Company's Total Number of Employees	0.611***	−0.100	0.283***	0.064	0.892***	0.770***	1								
8 Parent Company's R&D Intensity	0.100	0.327***	0.061	0.242***	−0.075	0.122*	−0.097	1							
9 Parent Company's Advertisement Intensity	0.096	−0.630	−0.061	0.266***	−0.105	0.115	−0.110	0.255***	1						
10 Parent Company's Labor productivity	0.425***	−0.024	0.119*	−0.007	0.607***	0.438***	0.272***	−0.188**	−0.060	1					
11 Subsidiary's Experience in the Host Country	−0.070	0.011	0.269***	0.370***	0.003	0.101	0.077	0.053	0.116	−0.153**	1				
12 Subsidiary's Intensity of Japanese Employment	−0.285***	−0.220***	−0.197**	−0.807***	−0.029	−0.160**	−0.014	−0.217***	−0.407***	−0.011	−0.262***	1			
13 Parent Company's Number of Subsidiaries in the Host Country	0.753***	0.153**	0.241***	0.133*	0.643***	0.581***	0.560***	0.113	0.020	0.351***	−0.069	−0.191**	1		
14 Parent Company's Experience in the Host Country	0.276***	0.165**	0.324***	0.343***	0.223***	0.267***	0.248***	0.127*	0.138*	0.100	0.514***	−0.319***	0.417***	1	
15 Subsidiary's Total Sales	0.124*	0.499***	0.357***	0.763***	0.054	0.211***	0.085	0.172**	0.060	0.034	0.358***	−0.480***	0.050	0.297***	1

Note: *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level

Table 1C : Correlation Matrix of Independent Variables L. A. - Manufacturing

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Parent Company's Global Number of Subsidiaries	1														
2 Parent Company's Export Intensity	0.463**	1													
3 Subsidiary's Equity	0.273	0.191	1												
4 Subsidiary's Total Number of Local Employees	0.292	−0.034	0.082	1											
5 Parent Company's Total Assets	0.716***	−0.021	0.318	0.312	1										
6 Parent Company's Equity	0.639***	0.135	0.116	0.180	0.739***	1									
7 Parent Company's Total Number of Employees	0.734***	0.154	0.217	0.352*	0.900***	0.875***	1								
8 Parent Company's R&D Intensity	−0.126	−0.596***	−0.102	0.116	0.201	0.393*	0.292	1							
9 Parent Company's Advertisement Intensity	0.378	−0.213	−0.076	0.561***	0.632***	0.228	0.515**	0.057	1						
10 Parent Company's Labor productivity	0.691***	0.184	0.326*	−0.094	0.624***	0.418**	0.400*	−0.271	0.057	1					
11 Subsidiary's Experience in the Host Country	−0.009	−0.349*	0.236	0.405**	0.145	0.191	0.134	0.305	0.020	0.047	1				
12 Subsidiary's Intensity of Japanese Employment	−0.318*	−0.117	−0.001	−0.861***	−0.206	−0.127	−0.299	−0.001	−0.518**	0.134	−0.428**	1			
13 Parent Company's Number of Subsidiaries in the Host Country	0.866***	0.419***	0.343*	0.399*	0.519**	0.290	0.500**	−0.131	0.401*	0.466**	−0.163	−0.400*	1		
14 Parent Company's Experience in the Host Country	0.382*	−0.367*	0.296	0.217	0.461**	0.211	0.340*	0.221	0.381*	0.310	0.553***	−0.236	0.331*	1	
15 Subsidiary's Total Sales	0.310	0.026	0.140	0.807***	0.196	0.234	0.272	0.073	0.182	0.065	0.642***	−0.679***	0.276	0.226	1

Table 1D : Correlation Matrix of Independent Variables L. A. - Services

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Parent Company's Global Number of Subsidiaries	1														
2 Parent Company's Export Intensity	−0.277	1													
3 Subsidiary's Equity	0.885***	−0.064	1												
4 Subsidiary's Total Number of Local Employees	0.847***	−0.482	0.812**	1											
5 Parent Company's Total Assets	0.584*	0.042	0.789**	0.699**	1										
6 Parent Company's Equity	0.576*	0.180	0.500	0.398	0.684**	1									
7 Parent Company's Total Number of Employees	0.272	0.323	0.469	0.449	0.865***	0.675**	1								
8 Parent Company's R&D Intensity	−0.409	0.768**	−0.444	−0.775**	−0.394	0.155	−0.126	1							
9 Parent Company's Advertisement Intensity	0.340	0.018	−0.044	−0.014	−0.123	0.615*	−0.064	0.454	1						
10 Parent Company's Labor productivity	0.726**	−0.701**	0.710**	0.856***	0.637*	0.327	0.243	−0.814**	−0.072	1					
11 Subsidiary's Experience in the Host Country	0.033	−0.064	0.104	0.098	0.549*	0.588*	0.533	−0.040	0.123	0.334	1				
12 Subsidiary's Intensity of Japanese Employment	−0.757**	0.580*	−0.632*	−0.934***	−0.431	−0.174	−0.230	0.794**	−0.005	−0.734**	0.094	1			
13 Parent Company's Number of Subsidiaries in the Host Country	0.376	−0.937***	0.097	0.584*	0.088	0.086	−0.097	−0.708**	0.204	0.698**	0.181	−0.668**	1		
14 Parent Company's Experience in the Host Country	0.159	−0.380	0.134	0.307	0.559*	0.596*	0.480	−0.278	0.187	0.559*	0.857***	−0.104	0.514	1	
15 Subsidiary's Total Sales	0.690**	0.345	0.616*	0.512	0.590*	0.816**	0.645*	0.129	0.525	0.169	0.131	−0.401	−0.073	0.098	1

Note: *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level

model.

Factor Extraction

The goal of factor extraction is to obtain estimates of the common (unrotated) factors; a task for which several different methods can be used. In the current case, the method of principal components analysis was chosen. In this method, linear combinations of the observed variables are formed.

Tables 3A and 3B show the portion of the variance explained by each factor. The total variance is the sum of the variance of each variable. All variables are expressed in standardized form, with a mean of zero and a standard deviation of one. Since there are 15 variables and each is standardized to have a variance of one, the total variance is 15. The total variance explained by each factor is listed in the column labeled Eigenvalue. The corresponding percentage of the total variance attributable to each factor and the cumulative percentage are presented in the next two columns respectively.

In deciding how many factors to extract (when to stop factoring) several criteria can be applied. For the current analysis, the following two were used. 1) *Latent root or eigenvalues criterion*: under this approach, only factors that account for variances greater than one are considered significant and should be included. 2) *Scree test criterion*: The scree test is derived by plotting the eigenvalues against the number of factors in their order of extraction. The point where the curve first begins to straighten out is considered to indicate the maximum number of

Table 2 : Tests for the appropriateness of the factor analysis model

Test		USA		L. A.	
		Manufacturing	Services	Manufacturing	Services
Overall KMO Measure of sampling adequacy		0.739	0.684	0.569	0.570
Bartlett' test of sphericity	Approx. Chi-Square	943.14	1512.48	155.89	1083.75
	Significance level	0.000	0.000	0.001	0.000

Table 3 A: Variance explained by each factor - USA

Factor	Manufacturing			Services		
	Eigenvalue	Percentage of Variance	Cumulative Percentage of Variance	Eigenvalue	Percentage of Variance	Cumulative Percentage of Variance
1	4.87	32.49	32.49	4.30	28.66	28.66
2	2.22	14.79	47.28	2.27	15.14	43.80
3	1.47	9.82	57.10	1.53	10.19	53.99
4	1.36	9.06	66.16	1.23	8.19	62.18
5	1.05	7.00	73.16	1.12	7.46	69.64
6	Under 1			Under 1		

Table 3 B: Variance explained by each factor - L. A.

Factor	Manufacturing			Services		
	Eigenvalue	Percentage of Variance	Cumulative Percentage of Variance	Eigenvalue	Percentage of Variance	Cumulative Percentage of Variance
1	3.95	26.33	26.33	4.10	27.32	27.32
2	2.09	13.92	40.25	2.47	16.49	43.81
3	1.95	13.03	53.28	1.61	10.76	54.57
4	1.43	9.50	62.78	1.53	10.18	64.75
5	1.10	7.35	70.13	1.12	7.88	72.63
6	Under 1			Under 1		

factors to extract. Based on the results shown in tables 3A and 3B and on the scree plots (not reproduced in the body of the paper), it is concluded that five factors are appropriate for representing the data.

Factor interpretation and Factor Rotation

Factors with large loadings (coefficients in absolute value) for a variable are closely related to the variable. Unrotated factor solutions achieve the objective of data reduction, but it is usually difficult to identify meaningful factors based on this matrix. In order to simplify the factor structure and achieve theoretically more meaningful factor solutions, a rotation of factors is applied. When the axes are maintained at right angles, the rotation is called orthogonal. An orthogonal solution is the best one when the purpose is to reduce a larger number of variables to a smaller set of uncorrelated variables for subsequent use in regression or other prediction technique. A variety of approaches can be used for orthogonal rotation. Out of them the *varimax method* was chosen for the current paper. This method emphasizes the interpretation of the factors.

To identify the factors, it is necessary to group the variables that have large *loadings* for the same factor. The grouping of the variables by factor is presented in Table 4. The label is intuitively developed based on its appropriateness for representing the underlying dimensions of a particular factor. Based on the rotated component matrix five factors were identified.

Factor 1 includes parent company's total assets, parent company's equity, parent company's total number of employees, and parent company global number of subsidiaries, proxying for parent company scale (size). Factor 2 includes parent company's advertisement intensity, parent company's labor productivity, and parent company' number of subsidiaries in the host country, proxying for parent company's activity intensity. Factor 3 includes the variables related to subsidiary scale (size), i.e., subsidiary's equity, subsidiary's total sales, subsidiary's total number of local employees, and subsidiary's intensity of Japanese employment. Factor 4 includes the subsidiary's experience in the host country, and the parent company's experience in the host country, proxying for experience. Factor 5 can be considered a proxy for trade effort, and it includes parent company's export intensity, and parent company's R&D intensity. The relationship between exports and innovation (R&D) was pointed out by Krugman's *New Theory of Trade*, and a great body of literature has been devoted to that topic.

The correspondence between the five factors and the OLI advantages is as follows. *Ownership advantages*: (1) Parent company scale, (2) Parent company's activity intensity, and (3) Subsidiary scale. *Internalization advantages*: (4) Experience and (5) Trade effort. As previously explained, Location advantages were not necessary in the current analysis, since the samples are clearly segregated by very homogeneous geographical areas. Regarding the indicators, they are related to the advantages through the factors.

There are just three exceptions in the above-mentioned classification. The parent company's number of subsidiaries in the host country and the parent company's advertisement intensity for USA manufacturing companies actually in factor 1 (parent company scale) when they should be in factor 2 (parent company's activity intensity). And the parent company's global number of subsidiaries for USA service companies, actually in factor 2 when it should be in factor 1. The effect of those exceptions is not considered significant, since the differentiation of those variables as proxies for scale or scope is very subtle.

Ordered Multinomial Logistic Regression (Ordinal Regression)

With an ordinal dependent variable of 3 categories (gain, break-even, loss) a generalization of linear regression called a generalized linear model is used. The basic form of a generalized linear model is:

$$\text{link}(\gamma_j) = \theta_j - [\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k]$$

Where γ_j is the cumulative probability for the jth category, θ_j is the threshold or constant (corresponding to the intercept in linear regression models) for the jth category, $\beta_1, \beta_2, \ldots \beta_k$ are the regression coefficients, $X_1, X_2, \ldots X_n$ are the independent or predictor variables, and k is the number of predictors.

The thresholds or constants depend only on which

Table 4 : Variable location by factor

Factor	USA - Manufacturing	USA - Services	L.A. - Manufacturing	L.A. - Services
1	• Parent company's total assets • Parent company's equity • Parent company's total number of employees • Parent company's global number of subsidiaries • Parent Company's number of subsidiaries in the host country	• Parent company's total assets • Parent company's equity • Parent company's total number of employees	• Parent company's total assets • Parent company's equity • Parent company's total number of employees • Parent company's global number of subsidiaries	• Parent company's total assets • Parent company's equity • Parent company's total number of employees • Parent company's global number of subsidiaries • Parent company's advertisement intensity
2	• Parent company's advertisement intensity • Parent company's labor productivity	• Parent company's global number of subsidiaries • Parent company's advertisement intensity • Parent company's number of subsidiaries in the host country • Parent company's labor productivity	• Parent company's advertisement intensity • Parent company's number of subsidiaries in the host country • Parent company's labor productivity	• Parent company's number of subsidiaries in the host country • Parent company's labor productivity
3	• Subsidiary's equity • Subsidiary's total sales • Subsidiary' total number of local employees • Subsidiary's intensity of Japanese employment	• Subsidiary's equity • Subsidiary's total sales • Subsidiary's total number of local employees • Subsidiary's intensity of Japanese employment	• Subsidiary's equity • Subsidiary's total sales • Subsidiary's total number of local employees • Subsidiary's intensity of Japanese employment	• Subsidiary's equity • Subsidiary's total sales • Subsidiary's total number of local employees • Subsidiary's intensity of Japanese employment
4	Subsidiary's experience in the host country Parent company's experience in the host country	• Subsidiary's experience in the host country • Parent company's experience in the host country	• Subsidiary's experience in the host country • Parent company's experience in the host country	• Subsidiary's experience in the host country • Parent company's experience in the host country
	• Parent company' export intensity • Parent company's R&D intensity	• Parent company's export intensity • Parent company's R&D intensity	• Parent company's export intensity • Parent company's R&D intensity	Parent company's export intensity Parent company' R&D intensity

category's probability is being predicted, and they are not affected by the values of the independent variables. The prediction part of the model depends only on the independent variables, and it is independent of the dependent variable categories. These two properties imply that the results will be a set of parallel lines or planes. In other words, with this method, a separate equation is obtained for each category of the ordinal dependent variable.

The model is used to predict cumulative probabilities of membership in the categories for each case. That means that each equation gives a predicted probability of being in the corresponding category or any lower category. Consequently, the prediction for

the last category is always 1.0, and because of that the prediction equation for that category is not needed.

The model predicts a function of the cumulative probabilities, rather than their actual values. This function is called the link function and is a transformation of the cumulative probabilities that allows estimation of the model. The form of the link function should be chosen when determining the model. In order to choose a link function an examination of the distribution of cases by category for the dependent variable should be done. Although not reproduced in the body of this paper, the distributions of cases for the dependent variable show that the majority of the cases are concentrated in the higher categories (break-even and gain). For this kind of situation the *complementary log-log* is considered the most appropriate function, since it assumed the higher categories as more probable. The model also allows the inclusion of a scale component, as a modification to the basic form, to account for differences in variability for different values of the independent variables. However such differences in variability are not present in the current case, and consequently no scale component was included in the model.

Ordinal regression models have three main measures of predictive value (goodness of fit), i.e., 1) *Wald statistic*: The Wald statistic is the square of the ratio of the coefficient to its standard error. Significance level of the Wald statistic represents the significance of the variable. 2) *Chi-square statistic for the difference of log-likelihoods*: The chi-square reported is just the difference between -2 times the log-likelihood values for the intercept only (baseline) model and the final model (with the independent variables). A significant chi-square statistic indicates that the model gives a significant improvement over the baseline intercept-only model. 3) *Chi-square statistic for goodness-of-fit*: Pearson's chi-square and the deviance chi-square statistic are intended to test whether the observed data are inconsistent with the fitted model. When the significance values are large, that means

Table 5: Results of the Multivariate ordinal logistic regression Model 1

	USA		L. A.	
	Manufacturing	**Services**	**Manufacturing**	**Services**
Threshold 1 (loss)	−1.320 ***	−1.749 ***	−1.138 ***	−2.187 ***
	(226.792)	(464.816)	(41.878)	(62.342)
Threshold 2 (breakeven)	−0.516 ***	−0.634 ***	−0.189	−0.374 ***
	(63.960)	(148.035)	(2.207)	(7.089)
Parent company scale	0.015	0.142 ***	0.211 *	0.092
	(0.058)	(7.670)	(2.866)	(0.503)
Parent company scope	0.046	−0.052	−0.017	−0.224 *
	(0.528)	(1.062)	(0.020)	(3.021)
Subsidiary scale	0.111 *	0.187 ***	0.100	0.408 ***
	(3.135)	(12.333)	(0.651)	(7.621)
Experience	0.192 ***	0.187 ***	0.179	0.237 *
	(10.458)	(15.561)	(2.350)	(3.458)
Trade effort	−1.236	0.077	−0.098	−0.066
	(0.038)	(2.288)	(0.622)	(0.197)
Model Indices				
Number of cases	561	951	120	117
Chi-square statistic for the difference of log-likelihoods	13.484 **	36.084 ***	6.156	14.550 ***
Chi-square statistic for goodness-of-fit: Pearson	1121.76	1896.64	240.64	239.05
Chi-square statistic for goodness-of-fit: Deviance	1108.89	1788.40	252.33	212.76

Notes: Wald-statistics in parenthesis; *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level

that they are not inconsistent and it is concluded that the data and the model prediction are similar, implying that the model is a good one.

In order to test the influence of entry mode on performance two models were run. Model 1 includes the five factors determined through factor analysis as independent variables. This model reflects the influence of ownership and internalization advantages on performance. Model 2 is basically the same as model 1 but it also includes the entry mode. The results of model 1 and model 2 are shown in Tables 5 and 6 respectively.

The sign of the coefficients give important insights into the effects of the independent variables in the model. The signs essentially indicate the direction of the effect. As expected, parent company scale, subsidiary scale, and experience show a positive impact on performance while, in general terms, parent company's activity intensity and trade effort show a negative impact, but it is not significant. Experience is significantly affecting companies in the USA, and subsidiary scale is significantly affecting service companies in both areas. In general, at least one variable has significant coefficients in each regression.

The main objective of model 2 is to test if the entry

Table 6: Results of the Multivariate ordinal logistic regression Model 2

	USA		L. A.	
	Manufacturing	**Services**	**Manufacturing**	**Services**
Threshold 1 (loss)	−1.347 ***	−1.568 ***	−1.118 ***	−2.500 ***
	(87.876)	(86.467)	(20.069)	(18.112)
Threshold 2 (breakeven)	−0.543 ***	−0.451 ***	−0.169	−0.683
	(17.230)	(8.206)	(0.598)	(1.635)
Parent company scale	0.023	0.135 ***	0.214 *	0.081
	(0.120)	(6.844)	(2.878)	(0.384)
Parent company scope	0.052	−0.047	−0.016	−0.214 *
	(0.663)	(0.854)	(0.017)	(2.685)
Subsidiary scale	0.112 *	0.178 ***	0.101	0.405 ***
	(3.208)	(11.017)	(0.650)	(7.474)
Experience	0.195 ***	0.192 ***	0.181	0.226 *
	(10.667)	(16.406)	(2.376)	(3.119)
Trade effort	−0.017	0.082	−0.096	−0.078
	(0.068)	(2.560)	(0.580)	(0.270)
Entry mode				
Wholly-owned	−0.010	0.183	0.034	−0.340
	(0.004)	(1.218)	(0.015)	(0.372)
Acquisition	−0.140	0.617	−0.0319	—
	(0.425)	(3.486)	(0.002)	—
Joint venture	0	0	0	0
Model Indices				
Number of cases	561	951	120	117
Chi-square statistic for the difference of log-likelihoods	13.994 **	40.646 ***	6.177	14.993 ***
Chi-square statistic for goodness-of-fit: Pearson	1121.76	1904.32	240.59	244.31
Chi-square statistic for goodness-of-fit: Deviance	1108.38	1784.56	252.31	212.32

Notes: Wald-statistics in parenthesis; *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level

mode becomes statistically significant when it is combined with other variables in the analysis. With this purpose, entry mode was included as a categorical variable. When a categorical variable is used, the coefficients for each category, represent the effect of that category compared to a reference category. The coefficient for the reference category is zero and its choice is arbitrary. For the purpose of the current analysis the selected reference category is joint venture. The coefficient for wholly-owned represent the change in the probability of high performance when the selected entry mode was wholly-owned, compared to a selection of joint venture entry mode. Similarly, the coefficient for acquisition is the change in the probability of getting high performance when the selected entry mode was acquisition compared to joint venture. The coefficient for joint venture is necessarily zero, since it does not differ from itself. However, none of the entry mode categories is significant in any of the four samples.

The chi-square statistic for the difference of log-likelihoods is significant indicating that the model gives a significant improvement over the baseline intercept-only model. The results of the chi-square statistic for goodness-of-fit are not significant. These statistics are sensitive to empty cells. That means that they depend on a table whose cells are formed by aggregating the data (combining the cases) based on unique independent variable patterns. Every one of all the possible different combinations of the values of the independent variables will be represented by a unique cell that contain the cases that share those same characteristics. When estimating models with continuous independent variables, most cases have unique values for those variables. This results in a very large table with many empty cells. With such models, the fit test statistics are not reliable and its interpretation becomes difficult. Because of the empty cells, it is not sure that these statistics will follow the chi-square distribution, and the significance value may not be accurate.

CONCLUSIONS

This study examines the relationship between ownership and internalization advantages of Japanese parent companies and the attained performance of their subsidiaries. Based on the information contained in the Toyo Keizai Data Bank 2000, four samples were selected segregating manufacturing and services companies in the USA and in Latin America. Fifteen different characteristics of the parent company and the subsidiaries were extracted, based on the financial information contained in the database.

A factor analysis was applied to the fifteen selected characteristics. This analysis indicates that those characteristics indicated five factors that proxy for five different advantages of both the parent companies and the subsidiaries. This finding implies that, effectively, there is an underlying relationship among the financial indicators that separates them into different groups reflecting ownership and internalization advantages, i.e., hypothesis 1 is supported.

A correlation test for the fifteen selected characteristics indicates that a high degree of correlation exists among them, limiting their direct inclusion into the regression analysis. This problem was solved also through factor analysis. Scores were calculated for each of the five factors generated by factor analysis, and the original set of fifteen variables was substituted by those scores. The scores have the advantages that they are uncorrelated with each other, and consequently can be included in regression analysis.

Using the subsidiary's performance as dependent variable and five scores as proxies for ownership and internalization advantages, an ordered multinomial logistic regression (ordinal regression) model was applied. According to the ordered multinomial logistic model, at least one of the independent variables in every sample had a positive effect on performance. This finding indicates that the ownership and internalization advantages of the foreign parent firm and the subsidiary itself are positively associated with performance, supporting hypothesis 2. The model results are consistent for both developing and developed countries, and for manufacturing and service companies.

In addition to the base model of the ordered multinomial logistic regression (Model 1) an additional model, including the variable entry mode was run (Model 2). However, the inclusion of that

variable did not produce any improvement in relation to Model 1 and neither reflected a statistically significant result. Therefore, hypothesis 3 is also supported, and it is concluded that the attained performance of the subsidiaries is not directly associated with entry mode.

Acknowledgments

The authors thank Professor Stephen Turnbull of the University of Tsukuba for editing an earlier version of this paper. This research has been partly conducted with the assistance of "Grant-in-Aid for Scientific Research" from the Ministry of Education, Culture, Sports, Science and Technology of Japan.

Note: All the calculations in the analysis of the data were carried out using the SPSS 10.0 statistical package.

REFERENCES

Agarwal, Sanjeev and Sridhar N Ramaswami 1992 Choice of foreign market entry mode: Impact of ownership, location and internalization factors. *Journal of International Business Studies*, 23: 1-27.

Boddewyn, Jean J., Marsha B. Halbrich, Anne C Perry 1986 Service multinational: Conceptualization, measurement and theory. *Journal of International Business Studies*, 17 (Fall): 41-58.

Brown, Paul R., Virginia E. Soybel, Clyde P Stickney 1994 Comparing U.S. and Japanese corporate-level operating performance using financial statement data. *Strategic Management Journal*, 15: 75-83.

Cho, Kang Rae 1985 *Multinational banks: Their identities and determinants*. Ann Arbor: UMI Research Press.

Dunning, John H 1977 Trade, location of economic activity and the MNE: A search for an eclectic approach. In Bertil Ohlin et al., editors, *The international allocation of economic activity*. Proceedings of a Nobel Symposium held in Stockholm, London: Macmillan.

_____1980 Toward an eclectic theory of international production: Some empirical tests. *Journal of International Business Studies*, 11 (Spring/Summer): 9-31.

_____1988 The eclectic paradigm of international production: A restatement and some possible extensions. *Journal of International Business Studies*, 19 (Spring): 1-31.

Geringer, Michael J. and Louis Herbert 1991 Measuring performance of international joint ventures. *Journal of International Business Studies*, 22 (2): 249-263.

Gomes-Casseres, Benjamin 1989 Ownership structures of foreign subsidiaries. *Journal of Economic Behavior and Organization*, 11: 1-25.

Hair, Joseph F., Rolph E. Anderson, Ronald L. Tatham and William C. Black 1995 *Multivariate data analysis: with readings*. New Jersey: Prentice Hall.

He, Jia and Ng, Lilian K 1998 The foreign exchange exposure of Japanese Multinational Corporations. *Journal of Finance*, Vol. LIII, No.2.

Hennart, J.F. 1991 The transaction cost theory of equity joint ventures: An empirical study of Japanese subsidiaries in the United States. *Management Science*, 37: 483-497.

Kimura, Yui 1989 Firm specific strategic advantages and foreign direct investment behavior of firms: The case of Japanese semi-conductor firms. *Journal of International Business Studies*, 20 (Summer): 296-314.

Lecraw, Donald J. 1984 Bargaining power, ownership, and profitability of transnational corporations in developing countries. *Journal of International Business Studies*, 15 (Spring/Summer): 27-44.

Makino, Shige and Andrew Delios 1996 Local knowledge transfer and performance implications for alliance formation in Asia. *Journal of International Business studies*, 27 (5): 905-927.

Nihon Keizai Shimbunsha 2000 *Nikkei Kaisha Nenkan* (Annual Corporation Report). Tokyo.

Nitsch, Detlev, Paul Beamish, Shige Makino 1996 Entry mode and performance of Japanese FDI in Western Europe. *Management International Review*, 36: 27-43.

Norburn, David and Birley Sue 1988 The top management team and corporate performance. *Strategic Management Journal*, 9: 225-237.

Siripaisalpipat, Pimonwan and Yasuo Hoshino 2000 Firm-specific advantages, entry modes, and performance of Japanese FDI in Thailand. *Japan and the World Economy*, 12: 33-48.

Toyo Keizai Inc. 2000 *Kaigai Shinshutsu Kigyo Souran: Kuni betsu hen* (Japanese Overseas Investments by Country). Tokyo: Toyo Keizai Inc.

Vega-Cespedes, Cristian and Yasuo Hoshino 2001 Effects of ownership and internalization advantages on performance: The case of Japanese subsidiaries in the United States and Latin America, *Review of Pacific Basin Financial Markets and Policies*, 4 (March): 69-94.

Wilson, Brent D. 1980 *Disinvestment of foreign subsidiaries*. Ann Arbor: UMI Press.

Yu, Chwo-Ming and Kiyohiko Ito 1988 Oligopolistic reaction and foreign direct investment: The case of the U.S. tire and textile industries. *Journal of International Business Studies*, 19 (Fall): 449-460.

Received September 19, 2002
Accepted December 10, 2002