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Foreign Investment and Ownership Structure: An Empirical Analysis

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I. Introduction

An important decision that multinational firms (MNFs) face when expanding abroad concerns the specific form of their investment. The usual choice is between exports, licensing or franchising, and foreign production. In recent years, following the globalisation trend in the world economy, all modes of foreign expansion are met with increasing frequency. Among them, foreign direct investment (FDI) has become the most popular strategy. Barrell and Pain (1997) report that the number of MNFs has increased threefold since the 1980s, pushing the ratio of aggregate FDI stock to GDP in OECD economies from 4.7% in 1975 to over 10% in 1995. In the same year, the value of foreign affiliates' sales exceeded the value of world exports by around one quarter. Because of its importance in international development, FDI along with its determinants has been the subject of extensive research.[1]

Investing directly in foreign production does not necessarily lead to full ownership of the resulting firm. Partial ownership may be selected and a joint venture formed. In this case, the degree of partnership established becomes an important issue, because of the power of control that a greater ownership share brings with it. First, profits received depend on the final control agreement. Second, transfer prices can be determined more easily when greater control of the foreign partner is maintained. Third, ownership can be used as a mechanism to protect proprietary rights for which full contracting is not possible, especially when assets include

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public-good properties. On the other hand, sharing ownership with a domestic partner helps reduce market uncertainty and agency behavior due to lack of incentives. Thus, depending on firm characteristics and industry conditions, different ownership structures are occur. Yet, the literature on the main economic determinants of the foreign ownership choice remains limited (Hennart, 1991).[2]

Organizational economics provides the main theoretical background for the problem, stressing the role of transaction costs and monitoring needs. Empirical testing, however, has been difficult and limited. Pan (1996) argues that most previous research on ownership preferences is restricted to a single country of origin, either the U.S. (Gatignon and Anderson, 1988; Nakamura and Yeung, 1994) or Japan (Hennart, 1991; Cleeve, 1997). To our knowledge, Pan (1996) followed by Nakamura and Xie (1998) are the first to investigate the partnership determinants affecting ventures involving international firms headquartered in various countries and domestic firms in China, on the one hand, and Japan, on the other. Still, neither has investigated the choice between full and different degrees of partial ownership, thus making no distinction between the determinants of a 5% and a 95% share. Following some strands in the recent literature and the remaining open questions in the subject, the novelties in this paper are:

(a) the formulation of a model based on the hypothesis that MNFs select the ownership share maximising the net returns expected from their investment; the model emphasises the role of firm specific characteristics, which together with industry conditions determine the ownership structure of foreign affiliates
(b) the use of a discrete choice model, which takes into account the differences within the ownership sharing option, and
(c) the application of the model to MNFs of any nationality which in 1998 are located in Greece, a country not previously examined in the FDI literature.

The rest of the paper is organised as follows: Section II introduces the conceptual framework for the determinants of ownership structure. Section III presents the data and the econometric model. Section IV discusses the empirical findings and Section V concludes.

II. Conceptual Framework for the Choice of Ownership Structure

Firms pursue international expansion in order to attain the benefits of economies of scale for their production facilities and, in particular, for the control of their knowledge based assets, which are intangible and involve public-good properties. Geographical expansion of the scope of operations based on such economies increases the revenues of MNFs more than their costs, leading to considerable profits (Pfaffermayr, 1999). The question is what degree of ownership is preferable for achieving the largest returns, keeping in mind that it is ownership that confers residual rights of control over assets and profits (Hart and Moore, 1990). When sharing ownership, MNFs risk seeing (a) their technology or brand name used beyond the original agreement, (b) their costs increasing due to monitoring needs of

agency behavior on behalf of their local partners, and (c) spillovers benefitting their competitors. Risk and uncertainty are also present. As Nakamura and Xie (1998) argue, some of the intangible assets used in production as well as general spillover benefits to local suppliers are not verifiable. On the other hand, full ownership makes agency costs unavoidable due to a lack of contracting devices, which can fully substitute for incentive mechanisms.

Hennart (1988, p. 363) suggests four objectives that joint foreign-domestic ownership can achieve: «(1) taking advantage of economies of scale and diversifying risk; (2) overcoming entry barriers into new markets; (3) pooling complementary bits of knowledge; (4) allaying xenophobic reactions when entering a foreign market». Since they all describe inefficient markets, it is the presence of such inefficiencies or market failures that becomes a necessary condition for domestic-foreign partnerships to emerge (Cleeve, 1997). Alternatively, Kogut (1988, p. 319) claims that the motivation for joint ventures can be reduced to three factors: «evasion of small number bargaining, enhancement of competitive positioning (or market power), and mechanisms to transfer organizational knowledge».

Subsequently, depending on the relative efficiency properties of alternative ownership choices, the optimal choice of a profit-maximizing firm i is derived by selecting the ownership structure j ($j \in J$) that provides the highest net return, ρ_{ij}. The process may be repeated since major changes in ownership shares are observed after the establishment of a joint venture (Barbosa and Louri, 2001). If partnership is selected, its degree obeys the same selection principle. Majority, parity or minority ownership will be preferred according to the respective expected returns. Formally, the probability that ownership structure j is selected by firm i takes the form:

$$P_{ij} = \text{Prob}(\rho_{ij} > \rho_{ik}),\ \forall j,\ k \in J,\ k \neq j. \tag{1}$$

Partial ownership presumes looser ties to the parent firm but implies sharing risks related to uncertainties about local market conditions, competitors' behavior and industry-specific characteristics, such as concentration and capital intensity. On the other hand, R&D intensity as well as resource intensity may lead to full ownership, always depending on expected (local) agency behavior and the subsequent monitoring costs.

The returns expected by the parent firm from operating abroad are assumed to depend on the profitability of the affiliate combined with its future prospects as well as on the assets transferred to the affiliate (e.g., technology, brand name, marketing capabilities) for which a price is agreed. Thus, expected returns R may be expressed as in (2)

$$R = F_r(T, P), \tag{2}$$

where T is the amount of assets transferred to the affiliate, and P is its expected performance. The more profitable the affiliate is expected to be, the more the foreign partner will gain from increased ownership. Also, the larger the amount of

assets transferred (leading to higher transfer payments), the higher the degree of control desired. Hence, the degree of ownership demanded by the foreign partner will increase with P and T.

The affiliate's expected performance P is, in turn, affected by its current performance and its prospects as supported by its absolute potential and the conditions of the industry in which it operates.[3] Thus P can be expressed as

$$P = f_p(p, s, \text{CR}, \text{PCM}, \text{GR}), \tag{3}$$

where p is observed profits of the affiliate, and s size capturing the market power of the firm.[4] Size can also be thought of as a proxy for transferred assets, as the amount of transferred assets is expected to increase with the size of operations (Nakamura and Yeung, 1994). The concentration ratio, CR, as well as the price-cost margin, PCM, and growth rate, GR, of the industry are standard I.O. variables affecting expected performance and, subsequently, decisions on global strategies. High concentration indicates increased market power leading to higher profits, but at the same time increased profit volatility. Hence, its effect on ownership decisions is ambiguous. On the other hand, high price cost margins and growth rates boost profit expectations.

On the cost side, a firm that decides to invest in a production plant abroad incurs costs associated with the amount of investment to be made as well as organizational costs, especially with respect to avoiding shirking, inherent in the affiliate's operations (Gomes-Casseres, 1989). So, in addition to the usual investment costs referring to committed inputs and borrowing obligations, monitoring foreign operations is a new cost category relevant only for foreign expansion.

Monitoring becomes necessary because of unfamiliarity with the markets involved and the agency behavior involving local input suppliers. Monitoring costs are a positive function of geographical and cultural distance between home and host countries (Veugelers, 1991). The effort of monitoring increases also with the size of the labor force that the foreign firm has to supervise. Finally, monitoring needs (and hence costs) increase with the degree of opportunistic agency behavior expected. Teece (1986) claims that if investment specific assets are needed then the parties involved become locked in once the assets are deployed. Thus, the higher the asset commitment and the asset specificity required for the investment, the more vulnerable to agency behavior the foreign firm will be. Also, greater dependency on local resource production strengthens the bargaining power of local partners, who may redraw contracts and use the imported technology in their favor. A possible answer to the agency problem and the related monitoring costs is shared ownership, although, if efficient contracting is possible, full ownership may be a better option. Finally, R&D intensity is related to future returns through the negative effect of spillovers, which may benefit direct competitors and cause a loss of competitive advantage in the future (Nakamura and Xie, 1998). Therefore, the total costs that a foreign partner has to balance against expected profits can be expressed as

$$C = f_c(K, L, \text{LEVER}, \text{OR}, \text{RES}, \text{R\&D}, \text{CAP}, \text{SUNK}), \tag{4}$$

where K is capital, L is labor and LEVER is leverage taken by the firm. The importance of all three for the cost incurred by the MNF increases with the ownership share taken. OR is the distance between the home and the host country, which discourages ownership. RES, R&D, CAP and SUNK are industry variables, the first two measuring respectively the resource and technology intensity of production. The last two refer to the capital intensity of the industry and the sunk costs involved which proxy asset specificity. Both imply higher costs of monitoring the affiliate's operations and hence lead to a reduction in preferred ownership shares.

Combining the expected returns (Equation (2)) and the cost of control (Equation (4)) of the foreign partner we obtain the net returns expected from operating abroad as a function of the ownership share, i.e.,

$$\rho = R - C = g(j) \quad \text{with } 0 < j \leq 1. \tag{5}$$

The optimal share j, is the one that maximizes ρ, and can, subsequently, be expressed as a function of the specific firm and industry characteristics

$$j = f_j(F, I), \tag{6}$$

where F is a set of firm specific variables [p, g, s, K, L, LEVER, T, OR] and I is a set of variables referring to the industry conditions [CR, PCM, GR, R&D, RES, CAP, SUNK].

In addition to micro-economic variables affecting the choice of foreign ownership, macro-economic effects, such as the host country's institutional framework, taxation policy, investment incentives, etc., may also be important (Svejnar and Smith, 1984; Franko, 1989). Our main focus in this paper, is however the analysis of the micro-economic reasons for the observed variety of ownership structures keeping the macro-economic background constant. Thus, the ownership decision is examined after the selection of the host economy (a permissive and open one in this case) is made.

III. Model and Data

1. ECONOMETRIC MODEL

Following Equation (6) and since our main interest is the general degree of control and not the detailed ownership share, our dependent variable represents the individual choice of foreign firms for their affiliates abroad among three alternative ownership structures (full, majority and minority).[5] Subsequently, the natural candidate for our modelling is a discrete choice model. Among the available theoretical options (Greene, 1997), a multinomial logit model is chosen in which the disturbances, ϵ_{ij}, are assumed to be drawn from independent and identical extreme value distributions.[6] It provides a set of probabilities for the choice of firm i with characteristics $X = [I|F]$. These probabilities are:

$$P_{i0} = \frac{1}{1 + \sum_{k=1}^{2} \exp(\beta'_{Ik} I_i + \beta'_{Fk} F_i)} \tag{7}$$

$$P_{ij} = \frac{\exp(\beta'_{Ij} I_i + \beta'_{Fj} F_i)}{1 + \sum_{k=1}^{2} \exp(\beta'_{Ik} I_i + \beta'_{Fk} F_i)}, \quad j = 1, 2. \tag{8}$$

Equations (7) and (8) imply that the log-odds ratios can be computed as follows

$$\ln\left(\frac{P_{ij}}{P_{i0}}\right) = \beta'_{1j} I_i + \beta'_{Fj} F_i, \quad j = 1, 2. \tag{9}$$

As far as the estimation is concerned, it is useful that the odds ratio does not depend on the other choices, as the disturbances in the initial model are independent.[7] From a behavioral point of view, estimation of the marginal effects of the attributes on the probabilities is more interesting and is given by:

$$\mu_{ij} = \frac{\partial P_j}{\partial X_i} = P_j \left[\beta_j - \sum_{k=0}^{2} P_k \beta_k\right] = P_j[\beta_j - \bar{\beta}], \tag{10}$$

where $X = [I|F]$ and $\beta_k = [\beta_{Ik}|\beta_{Fk}]$ and the corresponding variance is:

$$\text{Asy.Var}[\hat{\mu}_j] = \sum_{l=0}^{2} \sum_{m=0}^{2} \left(\frac{\partial \mu_j}{\partial \beta'_l}\right) \text{Asy.Var}[\tilde{\beta}_l, \hat{\beta}_m] \left(\frac{\partial \mu'_j}{\partial \beta'_m}\right). \tag{11}$$

2. DATA

The study is based on a sample of 216 firms with different levels of foreign participation, located in Greece in 1997–1998. The sample, covering all major multinational firms in Greece, is collected by *ICAP*. The information refers to firm specific information regarding characteristics such as percentage of foreign ownership, origin of foreign partner, employment, capital, leverage, sales, profits, total assets, etc. Industry specific information is taken from the *Annual Industrial Surveys* and the *Census of Industry* published by the National Statistical Service.

Table I presents the ownership characteristics of our sample in 1998. In 46% of cases, minority ownership is selected.[8] The rest is divided between majority ownership (38%) and full ownership (16%). The food industry is most preferred by foreign firms, followed by cosmetics and chemicals. Non-metallic minerals, metal products, publishing and electrical machinery come next. These seven industries constitute 67% of the foreign presence in Greece. The rest is divided among the other fourteen industries, which show percentages of foreign ownership well below 6% each. The origin of the MNFs is EU (67%), non EU OECD (20%) and Other (13%).

Table I. Multinational firms' sectoral and ownership preferences in Greece, 1998

Sector		Sectoral preferences	Ownership preferences			
			Full	Majority	Minority	Total
Food	Number	**39**	**7**	**14**	**18**	**39**
	Percentage	18.06	17.95	35.90	46.15	100.00
Drinks	Number	**9**	**4**	**2**	**3**	**9**
	Percentage	4.17	44.44	22.22	33.33	100.00
Tobacco	Number	**4**	**1**	**3**	**0**	**4**
	Percentage	1.85	25.00	75.00	0.00	100.00
Textile	Number	**6**	**0**	**0**	**6**	**6**
	Percentage	2.78	0.00	0.00	100.00	100.00
Clothing	Number	**9**	**0**	**5**	**4**	**9**
	Percentage	4.17	0.00	55.56	44.44	100.00
Leather	Number	**1**	**0**	**1**	**0**	**1**
	Percentage	0.46	0.00	100.00	0.00	100.00
Wood	Number	**1**	**0**	**1**	**0**	**1**
	Percentage	0.46	0.00	100.00	0.00	100.00
Paper	Number	**4**	**1**	**0**	**3**	**4**
	Percentage	1.85	25.00	0.00	75.00	100.00
Publishing	Number	**12**	**0**	**3**	**9**	**12**
	Percentage	5.56	0.00	25.00	75.00	100.00
Coal and petroleum products	Number	**4**	**2**	**0**	**2**	**4**
	Percentage	1.85	50.00	0.00	50.00	100.00
Chemicals	Number	**24**	**5**	**10**	**9**	**24**
	Percentage	11.11	20.83	41.67	37.50	100.00
Cosmetics	Number	**30**	**6**	**16**	**8**	**30**
	Percentage	13.89	20.00	53.33	26.67	100.00
Plastics	Number	**11**	**3**	**3**	**5**	**11**
	Percentage	5.09	27.27	27.27	45.45	100.00
Non-metallic minerals	Number	**16**	**3**	**8**	**5**	**16**
	Percentage	7.41	18.75	50.00	31.25	100.00
Basic metals	Number	**4**	**0**	**1**	**3**	**4**
	Percentage	1.85	0.00	25.00	75.00	100.00
Metal products	Number	**12**	**1**	**3**	**8**	**12**
	Percentage	5.56	8.33	25.00	66.67	100.00
Machinery	Number	**5**	**0**	**1**	**4**	**5**
	Percentage	2.31	0.00	20.00	80.00	100.00
Electrical machinery	Number	**12**	**1**	**6**	**5**	**12**
	Percentage	5.56	8.33	50.00	41.67	100.00
Domestic electrical appliances	Number	**3**	**1**	**0**	**2**	**3**
	Percentage	1.39	33.33	0.00	66.67	100.00
Transport equipment	Number	**6**	**0**	**3**	**3**	**6**
	Percentage	2.78	0.00	50.00	50.00	100.00
Miscellaneous	Number	**4**	**0**	**2**	**2**	**4**
	Percentage	1.85	0.00	50.00	50.00	100.00
Total	Number	**216**	**35**	**82**	**99**	**216**
	Percentage	100.00	16.20	37.96	45.83	100.00

3. VARIABLES

The dependent variable (*ownership*) assumes the values of 0 for minority ownership, 1 for majority ownership and 2 for fully owned affiliates in 1998. The firm variables are instrumented with their lagged (1997) values, since the ownership choice of 1998 is assumed to depend on the already known firm characteristics. The (3-digit) industry variables are instrumented with averages from past years. The detailed variables used in the econometric estimation are defined below.[9]

Firm Variables

SIZE (Affiliate size): the logarithm of the value of sales.
CAPITAL (Fixed capital): the logarithm of the value of fixed capital.
LABOR (Employment): the logarithm of the number of employees.
PROFIT (Profitability): the ratio of profits to sales.
LEVER (Leverage ratio): the ratio of total debt taken by the firm to its total assets.
ORIGIN (Origin of foreign investment): a discrete variable, which assumes the value 1 if the foreign parent firm is located in the European Union (EU), 2 if it belongs to (non EU) OECD and 3 otherwise.

Industry Variables

CAP (Capital intensity): The ratio of gross investment to total output in the relevant industry over 1993–1995.[10]
CR (Oligopolistic structure): The share of employees contained in the industry's four largest firms in 1988.[11]
R&D (R&D intensity): Dummy variable equal to 1 if the industry is research intensive and 0 otherwise.[12]
RES (resource intensity): Dummy variable equal to 1 if the industry is resource intensive and 0 otherwise.[13]

IV. Empirical Findings

Table II presents the estimated marginal effects (Equation (10)) of the firm- and industry-specific characteristics on the probabilities of each separate choice (full, majority and minority). Two kinds of results are shown: (a) the separate importance of firm and industry characteristics (models 1–2), and (b) a compact version including different combinations of firm and industry attributes (models 3–7). All the estimated models are highly significant according to a likelihood test ratio of the hypothesis that the coefficients are zero, based on their corresponding calculated chi-squared value and degrees of freedom. In addition, the estimated models predict at least 51.4% and as much as 56.5%, of the ownership variation correctly.

Models 1 and 2 show the estimated effects of industry and firm non-nested versions. This decomposition aims at showing the relative importance of these two sets in explaining the degree of ownership. To test the relevance of industry variables, the hypothesis to be tested is

Table II. Estimated marginal effects on the probability of ownership preferences

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Full foreign ownership							
Constant	−0.1516	−1.1768***	−1.0239***	−0.9361***	−1.0119***	−1.0132***	−0.9813***
	(−0.98)	(−4.00)	(−3.08)	(−2.91)	(−3.28)	(−3.34)	(−3.17)
CAP	0.3046		2.7255	0.4668	0.2128	0.1922	−0.1302
	(0.11)		(0.94)	(0.23)	(0.11)	(0.10)	(−0.07)
CR	0.0033		0.0037	0.0020	0.0022	0.0022	0.0026
	(1.16)		(1.30)	(0.83)	(0.93)	(0.94)	(1.13)
R&D	0.0616		0.0493	0.0572	0.0575	0.0565	
	(1.16)		(0.99)	(1.16)	(1.15)	(1.713)	
RES	0.1279**		0.0811	0.1132**	0.1263**	0.1259**	0.1104**
	(2.05)		(1.32)	(2.08)	(2.43)	(2.45)	(2.25)
ORIGIN	−0.1115***		−0.0775**	−0.0821**	−0.0810**	−0.0808**	−0.0791**
	(−2.73)		(−2.00)	(−2.10)	(−2.05)	(−2.07)	(−1.98)
SIZE		0.0672**	0.0382	0.0346	0.0379	0.0374	0.0423
		(2.05)	(1.23)	(1.11)	(1.21)	(1.27)	(1.40)
CAPITAL		0.0351	0.0429**	0.0403*	0.0401*	0.0403**	0.0376*
		(1.54)	(2.05)	(1.88)	(1.85)	(2.08)	(1.93)
LABOR		−0.1017***	−0.0816**	−0.0738**	−0.0777**	−0.0771**	−0.0828**
		(−2.68)	(−2.21)	(−2.03)	(−2.13)	(−2.14)	(−2.26)
PROFIT		0.2921**	0.2973**	0.2557*	0.2418*	0.2424*	0.2498*
		(2.12)	(2.18)	(1.95)	(1.85)	(1.87)	(1.88)
LEVER		−0.0586	0.0295	0.0074	−0.0057		
		(−0.53)	(0.29)	(0.07)	(−0.06)		
p_{ij}	8.57%	14.28%	25.71%	20.00%	20.00%	22.86%	20.00%
Majority foreign ownership							
Constant	0.3400	0.1731	0.3169	0.2507	0.3063	0.1674	0.1704
	(1.58)	(0.41)	(0.61)	(0.49)	(0.62)	(0.36)	(0.36)
CAP	−8.1384**		−7.9437*	−5.7909*	−5.6746*	−5.6227*	−5.7078*
	(−1.96)		(−1.80)	(−1.94)	(−1.92)	(−1.90)	(−1.94)
CR	−0.0076		−0.0088*	−0.0071*	−0.0073*	−0.0076*	−0.0067*
	(−1.62)		(−1.80)	(−1.74)	(−1.81)	(−1.86)	(−1.74)
R&D	0.0768		0.0580	0.0463	0.0482	0.0565	
	(0.93)		(0.66)	(0.55)	(0.58)	(0.68)	
RES	0.0133		−0.0058	−0.0378	−0.0468	−0.0443	−0.0569
	(0.13)		(−0.05)	(−0.39)	(−0.51)	(−0.48)	(−0.64)
ORIGIN	0.0665		0.0845	0.0879*	0.08695*	0.0759	0.0768
	(1.36)		(1.60)	(1.67)	(1.66)	(1.48)	(1.50)
SIZE		−0.0013	0.0286	0.0313	0.0294	0.01320	0.0155
		(−0.03)	(0.59)	(0.64)	(0.61)	(0.29)	(0.34)
CAPITAL		−0.0338	−0.0401	−0.0380	−0.0380	−0.0215	−0.0210
		(−1.08)	(−1.22)	(−1.16)	(−1.16)	(−0.73)	(−0.71)
LABOR		0.0730	0.0460	0.0401	0.0425	0.0501	0.0447
		(1.38)	(0.80)	(0.71)	(0.76)	(0.90)	(0.81)
PROFIT		0.3165	0.3472	0.3843	0.3912*	0.4021*	0.4193*
		(1.38)	(1.41)	(1.61)	(1.64)	(1.69)	(1.77)
LEVER		−0.1600	−0.2335	−0.2105	−0.2030		
		(−0.97)	(−1.30)	(−1.20)	(−1.16)		
p_{jj}	50.00%	41.46%	43.34%	47.56%	47.56%	50.00%	47.56%

Table II. Continued

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Minority foreign ownership							
Constant	−0.1885	1.0037**	0.7070	0.6855	0.7056	0.8458	0.8109
	(−0.88)	(2.31)	(1.33)	(1.31)	(1.42)	(1.75)	(1.68)
CAP	7.8338*		5.2182	5.3241**	5.4618*	5.4305*	5.8381**
	(1.93)		(1.20)	(1.75)	(1.83)	(1.82)	(1.96)
CR	0.0043		0.0051	0.0052	0.0051	0.0054	0.0041
	(0.94)		(1.05)	(1.26)	(1.26)	(1.32)	(1.06)
R&D	−0.1384*		−0.1073	−0.1035	−0.1056	−0.1130	
	(−1.67)		(−1.22)	(−1.22)	(−1.26)	(−1.35)	
RES	−0.1412		−0.0753	−0.0754	−0.0794	−0.0815	−0.0534
	(−1.38)		(−0.69)	(−0.77)	(−0.85)	(−0.87)	(−0.59)
ORIGIN	0.0451		−0.0070	−0.0059	−0.0060	−0.0050	0.0023
	(0.89)		(−0.13)	(−0.11)	(−0.11)	(−0.09)	(0.05)
SIZE		−0.0659	−0.0668	−0.0659	−0.0673	−0.0506	−0.0578
		(−1.47)	(−1.36)	(−1.34	(−1.38)	(−1.09)	(−1.25)
CAPITAL		−0.0013	−0.0028	−0.0028	−0.0020	−0.0189	−0.0167
		(−0.04)	(−0.08)	(−0.07)	(−0.06)	(−0.63)	(−0.56)
LABOR		0.0287	0.0356	0.0337	0.0352	0.0270	0.0381
		(0.53)	(0.61)	(0.59)	(0.62)	(0.48)	(0.68)
PROFIT		−0.6086**	−0.6445**	−0.6400**	−0.6331**	−0.6445**	−0.6691***
		(−2.50)	(−2.48)	(−2.54)	(−2.52)	(−2.57)	(−2.67)
LEVER		0.2186*	0.2040	0.2031	0.2087		
		(1.75)	(1.12)	(1.15)	(1.18)		
p_{ij}	67.68%	76.77%	73.74%	73.74%	73.74%	73.74%	71.72%
Sample Size	216	216	216	216	216	216	216
Log-likelihood	−207.149	−206.182	−195.662	−196.205	−195.662	−197.254	−198.435
p	51.39%	53.24%	55.56%	55.09%	55.09%	56.48%	54.17%
χ^2	26.41	28.35	49.39	48.30	47.73	46.20	43.84
P-value	2.29%	0.16%	0.17%	0.10%	0.05%	0.03%	0.02%
Likelihood ratio test	22.97	21.04	–	1.08	1.66	3.18	5.55
P-value	1.08%	10.06%	–	58.13%	79.85%	78.56%	69.80%

Figures in parentheses are t-ratios.
*, ** and *** mean that coefficients are statistically significant at 10%, 5% and 1% level, respectively.
The indicator p_{jj} measures the proportion of correct predictions for choice j.
The indicator p measures the proportion of correct predictions for all choices.

$$H_0: \; y = \beta_F' F + \epsilon$$
$$H_1: \; y = \beta_I' I + \beta_F' F + \epsilon,$$

or $\beta_I = 0$. Hypothesis H_0 is a firm version, while H_1 includes industry and firm nested versions. Using a likelihood ratio test, the joint hypothesis that the coefficients on I are all zero is rejected at the 10% level of significance. To test the relevance of firm variables, the respective hypothesis is

$$H_0' : \; y \; = \; \beta_I' I + \epsilon$$
$$H_1' : \; y \; = \; \beta_I' I + \beta_F' F + \epsilon,$$

or $\beta_F = 0$. Hypothesis H_0' is an industry version now, while H_1' includes industry and firm nested versions. Using a likelihood ratio test, the joint hypothesis that firm level variables are insignificant, is rejected at the 1% level of significance. Besides industry characteristics, firm-specific variables are found to contribute significantly to the explanation of the MNFs' share in foreign operations. As some of the variables do not always exert a statistically significant effect on the ownership choice (model 3), different versions of the full model are estimated in models 4 to 7 in order to derive the version with the most statistical support. The hypothesis to be tested becomes

$$H_0'' : \; y \; = \; \beta_1' Z_1 + \epsilon$$
$$H_1'' : \; y \; = \; \beta_1' Z_1 + \beta_2' Z_2 + \epsilon,$$
$$X \; = \; [I|F] = [Z_1|Z_2] = [I_1 F_1 | I_2 F_2],$$

so the test is of the hypothesis that $\beta_2 = 0$. Model 6 shows the highest proportion of correct predictions for all ownership choices and its findings are adopted.

Of the industry variables, capital intensity is estimated to affect negatively the majority and positively the minority ownership choice. Such a finding supports the explanation that in industries with high capital requirements, multinational firms prefer to share ownership and hence reduce financial strain and risk. The same rationale seems to hold in highly concentrated industries, where multinational firms prefer minority ownership in an effort to reduce the risks involved in oligopolistic markets. Resource intensity positively affects full ownership, since MNFs, often motivated to expand into foreign territories by resource availability, prefer not to share ownership of these resources probably because agency problems are bound to appear in the future if domestic agents share in the control and knowledge involved. Such a choice has to be supported by efficient contracting with the local resource providers. R&D intensity impacts negatively on the minority option, but its effect is statistically weak, probably due to scant information, R&D intensity being proxied by a dummy.

Of the group of firm specific variables, the origin of the MNF affects negatively the full ownership choice and positively the power sharing option, indicating that the (geographically and culturally) closer firms prefer larger ownership shares, as they enjoy reduced uncertainty and hence lower monitoring costs. On the contrary, increasing distance encourages power and control sharing, so that risks are reduced. Firm size in terms of sales, possibly indicating market power, has a correctly signed but statistically weak effect. Invested fixed capital, possibly related to the level of

technology used, is found to encourage foreign partners to fully own their affiliates a fact demonstrated by its positive effect on the full ownership choice. The size of the labor force taken as an indicator of the monitoring problems to be faced in the running of the foreign operations, is found to exercise a significantly negative effect on full ownership. Past profitability of the subsidiary, as very clearly explained by the theory, is an important determinant of the ownership choice. The more profitable the subsidiary, the higher the probability of observing full or majority ownership. On the contrary, its effect on the minority share is negative and highly significant, stressing that MNFs avoid sharing control as profits increase. The debt obligations undertaken by the subsidiary, although significant only once for the minority option, reflect the tendency of the MNFs to prefer minority holdings in highly leveraged firms.

V. Conclusions

The ownership structure that MNFs select when expanding their production abroad is an interesting but not frequently addressed part of the FDI literature. Moreover, in the few studies on the subject, the distinction is drawn between full and partial ownership, treating ownership sharing similarly irrespective of its degree. In this paper, the optimal ownership share, defined as full, majority and minority (including parity), is derived by maximizing the profits MNFs expect to receive from their foreign investment after having taken into account transaction and other cost considerations. A multinomial logit model is then used for the econometric testing of the theory. The variables affecting MNFs' optimal share in foreign operations are industry- and firm- specific, the latter being examined for the first time in such detail and contributing an important part in the econometric explanation.

MNFs, when selecting full ownership, are found to be influenced mainly by the resource intensity of the industry and firm-specific variables. Geographical and cultural distance plays a negative role, while invested capital and expected firm profits exercise a strong positive effect. Furthermore, employment, underlying the size of monitoring effort, impacts negatively upon the full ownership option.

Majority ownership is negatively affected by the capital intensity of the industry and its concentration ratio, underlying the desire to share ownership when a large and risky project is involved. Distance affects the sharing option in a positive way. Firm-specific characteristics are less significant for this alternative, among which only expected profitability exercises a positive effect.

Minority ownership is affected positively by capital intensity and concentration, and negatively by R&D. MNFs prefer a minority share when the capital requirements are large, uncertainty due to oligopolistic conditions is high and R&D intensity is small. Among the firm-specific characteristics, profitability is strongly significant in a negative way, displaying the reluctance of MNFs to select a minority position when profitability is high. On the contrary, the positive sign of leverage

shows the preference of MNFs for a minority position when financial obligations are large.

Future research in the subject may include additional explanatory variables, such as R&D and advertising or marketing intensity on a firm level, among others. Consideration of these variables would shed light on further aspects of transaction costs theory. Finally, distinguishing among different subsidiary roles could also provide some deeper understanding of the ownership structure chosen by MNFs in host countries.

Notes

1. For a detailed review of the literature on FDI and its determinants, see Dunning (1996).
2. The literature on managerial theories investigates the issue of firm ownership structure, although this type of research does not explicitly deal with MNFs. Nevertheless, some of the empirical findings (Demsetz and Lehm, 1985; Leech and Leahy, 1991; Belakoui and Pavlik, 1992; Jaditz, 1992) provide the same insight into the main determinants of ownership structure that has been useful for our research.
3. Lall (1978, 1980) and Teece (1985) provide a comprehensive analysis of the relationship between industrial structure and foreign investment.
4. In a study using detailed firm specific information in the American manufacturing industry. Grubaugh (1987) found that firm size as well as R&D intensity affect the decision of a firm to become multinational in the first place.
5. For instance, a two-percentage-points ownership change makes no difference in control, when it is between 20 and 22%, while it makes a great difference when moving from 49 to 51%, or possibly from 93 to 95%.
6. A multivariate probit model, in which the disturbances are assumed to be normally distributed, was also tried but did not produce satisfactory results.
7. A specification test introduced by Hausman and McFadden (1984) failed to reject the hypothesis that the disturbances are independent, i.e., that the differences in the coefficients are not systematic.
8. Minority ownership includes parity or 50–50 ownership, since no statistical difference in the behavior of the two cases was found.
9. Among the industry variables included in sunk cost, price cost margin and growth rate were found not to exert a significant influence on any of the available choices, hence they are not reported either in the variable description or in the econometric results.
10. The most recent Annual Industrial Surveys refer to 1993–1995.
11. The last published Census of Industry reporting concentration ratios refers to 1988.
12. The classification of industries proposed by Davies and Lyons (1996) is adopted. The R&D intensive industries are plastics, chemicals, oil and coal, machinery, electrical and electronic machines, transport equipment, shipbuilding, and precision instruments.
13. The classification of Gomes-Casseres (1990) was followed, classifying the following as resource intensive: food, beverages, tobacco, textiles, clothing, footwear, leather, wood, pulp and paper and mineral products.

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