3. Why multinationality matters: exploring the 'L' in the OLI paradigm

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INTRODUCTION

Asking whether the degree of multinationality of a firm affects its performance is an old question in the international business literature. However, being an old topic does not imply the debate is settled. Sullivan (1994) reviews 17 studies; seven report a positive relationship, five negative and six indeterminate. Our own literature review found more than two dozen performance–multinationality studies using a wide variety of proxy variables. The studies show a generally positive relationship, but the results are not always significant nor of the expected sign.

Hitt, Hoskisson and Ireland (1994) and Gomes and Ramaswamy (1999) argue that, while methodological problems are partly responsible for these inconsistent results, the real problem is the lack of theory building. Both papers address this lacuna by hypothesizing that multinationality has benefits and costs. Initially, benefits dominate costs because the multinational enterprise (MNE) chooses familiar locations and simple organizational structures, but eventually costs rise as locations become more culturally distant and the firm adopts a more complex structure. As a result, the multinationality–performance relationship should be inverse U-shaped, rising and then falling.

We extend this research by nesting the theoretical foundations for the multinationality–performance relationship in the OLI paradigm (Dunning, 1993a), which argues that MNEs create value by using their ownership (O) advantages in conjunction with location (L) advantages of foreign countries. In the original OLI paradigm, L refers to *country specific* advantages; we reconceptualize L as *firm specific* advantages of having a multinational network.[1] We hypothesize that multinationality has three facets: two measuring depth (foreign market penetration and foreign

production presence) and a third, breadth (country scope). Increasing breadth and/or depth has both advantages and disadvantages for the MNE that affect performance. We hypothesize that both O and L advantages positively and interactively affect performance, but that the net benefits from multinationality taper off as L increases.

The chapter is organized as follows. First, we provide a brief literature review and next develop our theoretical framework and hypotheses. We test the hypotheses on a sample of US manufacturing MNEs over the 1990–4 period using moderated multiple regression analysis. Our empirical analysis, discussion and conclusions follow.

LITERATURE REVIEW

Because there are already good reviews available of the extensive literature on the multinationality–performance relationship (see Sullivan, 1994; Gomes and Ramaswamy, 1999), we focus on papers published in the past five years. Two themes dominate this research.

The first theme is related to the measurement of multinationality. Nguyen and Cosset (1995) argue that multinationality has three facets: structural, performance related and behavioral. They find that different proxies can lead to different results and argue that scholars should be cautious in drawing comparisons across studies using different measures of multinationality. Sullivan (1994, p. 338) finds nine different multinationality proxies in the literature and develops a five-component index that he concludes 'reduc[es] the error that results from sample, systematic, and random bias'.[2] Ramaswamy, Kroeck and Renforth (1996) criticize the use of factor analysis to select the variables and constant weights to form the index. They argue that, given the lack of theory for selecting the index's components, an overall index may be theoretically suspect and premature.[3] Sullivan responds that a composite scale is 'a useful method to enhance the goodness of the sample, clarify the extent of random and systematic error, fortify the reliability and content validity of results, and contribute to estimating construct validity' (1996, p.190).

The second focus has been on building theory to explain the multinationality–performance relationship. Allen and Pantzalis (1996) propose operating flexibility as a theoretical framework, and breadth and depth as the two key components of multinationality. They hypothesize that multinationality positively affects performance by increasing the MNE's ability to shift resources and factors across borders and within a transnational network. Using proxies for breadth and depth of multinationality, they find the high breadth, low depth multinationals achieve

superior performance.[4] Others have argued that multinationality has both costs and benefits (Hitt, Hoskisson and Ireland, 1994; Gomes and Ramaswamy, 1999). The multinationality–performance relationship is curvilinear (inverted U) because greater geographic dispersion increases the costs of coordinating, integrating and managing the MNE's overall operations. The benefits of multinationality arise from the ability to leverage scale economies; utilize home-based skills, competencies and resources; and arbitrage differences in factor costs across countries. However, as multinationality increases, the MNE must adopt more complex and costly organizational structures and move to less familiar settings where higher cultural diversity raises transactions costs. Recent empirical work supports the inverted-U multinationality–performance relationship (see, for example, Hitt, Hoskisson and Kim, 1997; Riahi-Belkaoui, 1998; Gomes and Ramaswamy, 1999).

The past few years have seen an explosion of research on the multinationality–performance relationship. The beginnings of a theoretical framework are emerging but there is still broad disagreement on the measurement and definition of multinationality. We argue below that the OLI paradigm can provide a solid theoretical underpinning for this relationship.

THEORETICAL FRAMEWORK

The OLI or eclectic paradigm (Dunning, 1993a) asserts that MNEs are successful because of their ownership (O), location (L) and internalization (I) advantages. If a firm is to be profitable abroad, it must have some ownership advantages, not shared by its competitors, which are internal and specific to the enterprise but readily transferable across borders within the MNE network. There are three basic types of O advantages. The first is *knowledge-based assets*, which include all forms of innovatory activity including both process and product innovation and managerial capabilities. The second is *economies of common governance*, which include economies of scale and scope, economies of learning, and broader access to financial capital throughout the MNE organization. The third is *monopolistic advantages* in the form of privileged access to input and output markets (e.g. patent rights, brand names, ownership of scarce natural resources), which act as barriers to entry, enabling the MNE to earn monopoly rents.

In the traditional view of the OLI paradigm, the L explains where the firm goes. Because foreign factors are needed in order to realize maximum potential rents from the firm's O advantages, the MNE will choose to invest or not invest in different host countries depending on their environmental, social and policy-oriented characteristics (Dunning, 1993a). However,

instead of seeing L as a menu of existing and potential *host country* attractions, in this chapter we hypothesize that it should be seen as *firm-based advantages (and disadvantages) of having a multinational network.* By turning the L variable on its head – that is, from a country-based to a firm-based focus – we can integrate the multinationality – performance literature into the OLI paradigm and thereby provide the relationship with a solid theoretical foundation.

Let us reconceptualize L in the OLI paradigm as the advantages and disadvantages of multinationality. The MNE goes abroad to take advantages of cross-border opportunities that are not available to domestic firms. Dunning (1993a) argues that MNEs engage in four basic types of FDI: market seeking, resource seeking, rationalization or efficiency seeking, and strategic asset seeking. Through FDI, MNEs can exploit sources of competitive advantage not available to domestic firms, but are also open to costs and risks that do not face domestic firms. These cross-border locational *advantages* include:

- *Differences in cultures, demands and income levels.* Market-seeking FDI is designed to exploit profitable opportunities in higher income markets, generating rents on the firm's ownership advantages. FDI can also be used to shift sales towards lower income markets, extending the life of an obsolete product line. In international trade theory, these are the gains from exchange since they are generated by country-based differences in demand.
- *Differences in basic and created factor endowments.* Through resource-seeking FDI, a firm can shift production locations to take advantage of differences in basic factor endowments across countries. In addition, differences in knowledge-based assets and skilled labor across countries motivate strategic-asset-seeking FDI, allowing MNE to use foreign knowledge bases to generate world-wide learning within the enterprise. These represent specialization gains for the MNE.
- *Differences in government policies.* Differences in government regulation (e.g. taxes, subsidies) can also create locational advantages and cross-border potential gains for the MNE through cross-border arbitrage.

Lastly, both specialization and exchange gains are created by efficiency-seeking FDI, where an existing MNE reorganizes its production, distribution and sales networks to better arbitrage differences in endowments, markets and government regulations.

The three categories of cross-border differences outlined above offer the MNE a source of competitive advantage over domestic firms; that is, the ability to use FDI to arbitrage differences between, and take advantage of

new opportunities in, foreign countries. The higher breadth and depth of multinational involvement, the greater the potential rent-creating opportunities for the MNE. Cross-border arbitrage opportunities therefore offer the MNE *static, efficiency-motivated benefits* from multinationality.

Cross-border arbitrage opportunities can also provide *dynamic, strategic benefits* from multinationality. MNEs can take advantage of multiple locations to adapt flexibly to changes/shocks in the external environment. A wider MNE network provides the enterprise with real options that create excess market value (Allen and Pantzalis, 1996; Kogut and Kulatilaka, 1995). Global scanning increases the firm's ability to compete against other oligopolists in world markets. MNEs are better able than domestic firms to scan the global market looking for opportunities or avoiding threats. In addition, MNEs, due to their ability to move assets quickly between countries, have more bargaining power relative to location-bound actors, such as governments, trade unions and domestic firms.[5]

Cross-border arbitrage opportunities are not cost or risk free. As the number of foreign countries in which the MNE operates and the percentage of its operations that take place overseas increase, we expect the following cross-border locational disadvantages:

- *Costs and risks of multiple sources of value*. As Sundaram and Black (1992) argue, MNEs operate with multiple sources of value that create foreign exchange risks. Foreign sales are negatively affected by transaction exposure; market value and ability to raise capital are negatively affected by translation exposure; and the MNE's operations as a whole suffer from economic exposure.
- *Costs and risks of multiple levels of authority*. As the MNE expands into more countries, it is faced with higher cross-border transactions costs and higher interaction costs with a wider variety and number of governments. Multiple levels of authority also create higher political risks for the MNE (Sundaram and Black, 1992; Kostova and Zaheer, 1999).
- *Costs of greater cultural diversity*. As the number of foreign markets and production locations increase, the MNE is faced with the costs of adapting to new cultures. Institutional theory suggests that the liability of foreignness increases as firms move to more culturally distant countries (Gomes and Ramaswamy, 1999). As the number of institutional environments rises, it may be more difficult for the MNE to maintain legitimacy (Kostova and Zaheer, 1999).

As the number of foreign countries and the relative share of foreign operations increase, the costs of operating at a distance and the complexity of

managing the MNE also rise. The MNE must adopt more expensive global organizational structures to maintain strategic control of the MNE network. In addition, higher coordination costs and greater cultural distance suggest greater difficulty with resource (particularly tacit knowledge) transfers throughout the MNE network.

Multinationality therefore implies both advantages and disadvantages for the MNE. Given these costs and benefits, each firm chooses an optimal configuration of its resources and activities. That configuration is firm specific and a source of advantage to the MNE relative to its competitors. No two MNEs are likely to have exactly the same configuration because their goals, strategies and institutional histories differ. Cross-border arbitrage opportunities are bundled into a configuration of MNE activities and resources that give the multinational network both depth and breadth. Each MNE chooses its optimal degree of breadth and depth of multinational involvement, taking into account their benefits and costs.

We hypothesize that depth of multinationality can be conceptualized in two ways – depth and breadth. Depth includes both foreign market penetration and presence. *Foreign market penetration* is the dependence of the firm on foreign markets. The higher the foreign market share, the greater the gains from exchange and the ability to leverage rents on the MNE's ownership advantages; however, it also means more exposure to multiple sources of value and authority. *Foreign production presence* assesses the degree to which the enterprise is engaged in production-based activities across borders. The higher the foreign production share, the greater the gains from specialization and the dynamic gains from flexibility; however, it also means higher economic exposure, cross-border transactions costs and cultural diversity costs. *Country scope* is the geographic range or breadth of multinationality. The higher the country scope, the greater the cross-border arbitrage opportunities, suggesting higher potential static and dynamic gains; however, the higher also are the costs of multiple levels of authority and value.

We argue that a true MNE must score high on both dimensions of depth and breadth of multinationality. Given the existing breadth of the MNE network, the MNE can choose to allocate a higher or lower percentage of its total activities to foreign operations. In addition, vice versa, given its existing depth in foreign sales and assets, the MNE can allocate this depth across fewer or greater numbers of countries. Thus, we agree with Allen and Pantzalis (1996) that there may be a tradeoff between breadth and depth of multinationality.

We are now ready to assemble our theoretical model linking multinationality to firm performance. We argue that the OLI variables are linked, through their impact on FDI, to firm performance as outlined in Figure 3.1. New FDI that alters the MNE's breadth or depth of multinationality will

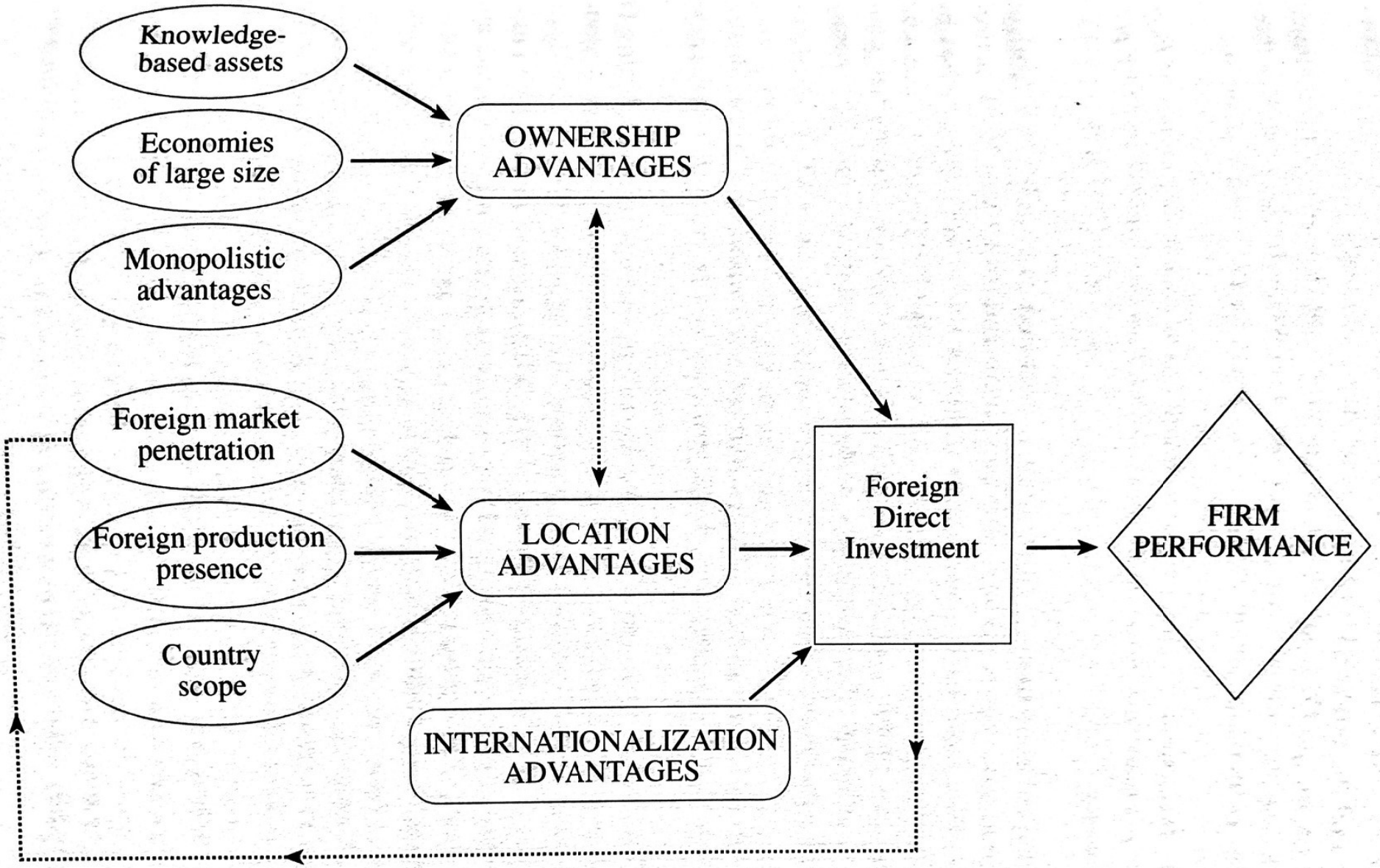

Figure 3.1 The OLI paradigm and firm performance

have second-round impacts on performance. Therefore, over time one would expect the OLI–performance relationship to be dynamic, with feedback effects and the potential for virtuous or vicious circles.

Following the OLI paradigm, we assume *a priori* that a multinational enterprise's performance is positively affected by each of the MNE's three types of ownership advantages.

H1: Ownership advantages (knowledge-based assets, economies of large size, monopolistic advantages) have direct, positive impacts on MNE performance.

We hypothesize that multinationality – defined as breadth and depth of locational advantages – contributes positively and directly to MNE performance. This hypothesis allows us to address the conclusion reached by Morck and Yeung (1991), Mishra and Gobeli (1998) and Gomes and Ramaswamy (1999) that multinationality is not an dependent predictor but rather moderates the ownership–performance relationship. H2 assumes that this conclusion is incorrect.

H2: Location advantages (foreign market penetration, foreign production presence, country scope) have direct, positive impacts on MNE performance.

Following the OLI paradigm, we also hypothesize that combining O advantages with L advantages generates higher performance. Using moderated regression allows us to test whether O moderates L (Itaki, 1991) or L moderates O (Morck and Yeung, 1991; Mishra and Gobeli, 1998) as a performance predictor. Our third hypothesis suggests that both views are correct; i.e., the interaction of O and L induces a second-round positive impact on performance (Dunning, 1993a).

H3: Ownership advantages combined with location advantages have additional synergistic, positive impacts on MNE performance over and above their individual direct impacts.

As a test of Sullivan's (1994) index of multinationality, we hypothesize that:[6]

H4: An index measure of multinationality is a better predictor of MNE performance than its decomposition into individual location advantages.

Lastly, we hypothesize that multinationality has both benefits and costs, with costs eventually dominating so that the positive impact on performance

tapers off (see Hitt, Hoskisson and Ireland, 1994; Hitt, Hoskisson and Kim, 1997; Riahi-Belkaoui, 1998; Gomes and Ramaswamy, 1999):

H5: The relationship between locational advantages and firm performance is curvilinear, rising and then declining, reflecting that multinationality carries both benefits and costs.

METHODOLOGY

Sample

Our sample was drawn from the S&P 500 for 1990–4. We limited the sample to manufacturing firms (primary SIC code: 2000–3999), resulting in 247 firms. We eliminated firms that were not headquartered in the United States and that did not have at least one foreign affiliate, according to Dun and Bradstreet (1996). Several firms had missing data, resulting in a pooled cross-section times-series data set of 151 firms over five years.

Measures

Our analysis uses two measures of MNE performance: return on assets (ROA) and excess market value (EMV). ROA is the most commonly used measure of financial performance in studies linking MNE performance to multinationality. Our second proxy, EMV, is a measure of excess market valuation of the firm over and above the value of its physical assets used as a proxy for Tobin's q.[7] High values for EMV suggest the existence of intangible assets, and an implicit valuation of the firm's ability to capture the benefits of these ownership advantages in its long-run market performance.[8] We see ROA as a measure of short-run financial performance, whereas EMV is a proxy for long-run market-based returns.

We have three measures for ownership advantages.[9] The most common proxy for knowledge-based assets used in international business research is the R&D-to-sales ratio (RDS).[10] The size of the firm, measured by total assets, is a common proxy for economies of common governance. We log the variable to linearize the data (LNASSET). As a proxy for monopolistic advantages, we use selling and general administrative (SG&A) expenses divided by total sales (SGAS). Since SG&A costs can also proxy for the overhead or fixed costs associated with the firm's global activities, if there are firm-level economies of scale, SGAS should decline as global sales increase.[11]

Our key multinationality measures are *foreign market penetration* as measured by the foreign sales ratio (FSTS), the most common proxy for multinationality; *foreign production presence* as measured by the foreign assets ratio (FATA); and *country scope* as measured by the number of countries where the MNE has foreign affiliates (NFCO).[12] Since foreign affiliates can be concentrated in particular countries, we chose NFCO instead of NFA as a proxy for country scope.[13] In addition, since most MNEs have foreign affiliates in OECD rather than developing countries, we define *developed country share* as the share of OECD-member countries in the total number of foreign countries where the MNE has operations.

Our fifth location variable, an index of multinationality (LOC), is used to test Sullivan's (1994) proposition that an index outperforms individual measures of multinationality. Following Gomes and Ramaswamy (1999), a composite index of multinationality is created by principal components analysis of FSTS, FATA and NFCO, using eigenvalues as weights. The Cronbach's alpha for the three variables is .8172, suggesting that the composite measure has validity.[14]

We introduce two types of control variables. The firm's debt–equity ratio (DERATIO) is included as to capture a portion of firm's value and financial indebtedness. A set of industry dummy variables is added to control for industry-specific impacts on performance.[15]

Data Analysis

Because our study employs pooled cross-section time-series regressions, we first ran F-tests to assess the feasibility of pooling the data across years. The results indicated that there were important year effects so we included year dummy variables, where 1994 is the (excluded) base year, in each regression. In addition, all independent variables except the industry dummies were centered at mean 100 to reduce multicollinearity, which reduced the variance inflation factors (VIFs) to acceptable levels. We also found evidence of heteroscedasticity (but not autocorrelation) and corrected for it by running OLS regressions with White-corrected standard errors.

We use moderated multiple regression analysis to ascertain the direct and indirect impacts of the location variable on firm performance. Our equations test the following model, where V is firm performance, in hierarchical stages:

$$V = \beta_0 + \beta_1 O + \beta 2\ L + \beta_3\ O{*}L$$

In stage 1, we test for the independent direct impacts of O and L on V; in stage 2, for their joint direct impacts, and in stage 3, for their moderator

impacts on firm performance. These represent hypotheses 1–3. We also substitute the composite measure LOC for the individual L variables and add a squared term LOCSQ in order to test hypotheses 4 and 5, respectively.

Results

Descriptive statistics are reported in Table 3.1. Regression results are reported in Tables 3.2 (ROA) and 3.3 (EMV). Because our variables are centered at mean 100, each coefficient should be interpreted as the conditional effect of the predictor variable at the mean of all the other predictors (Aiken and West, 1991, p. 39). Control variables are not reported in the tables. In general, OECD is positively and significantly related to ROA and EMV, whereas DERATIO is consistently negative and significant. Of the industry dummy variables, FOOD and METALS are consistently significant and positively related to performance. The year dummy variables are generally negative and significant for ROA, but positive and significant for EMV. We turn first to the ROA regressions in Table 3.2.

The general fit of the regressions is good, with R-squared values ranging from .1737 to .2999. The F statistics are all significant at $p < .0001$. In the first stage, we test for the independent effects of the O and L variables on performance. In stage 1(a), only SGAS is significant among the O variables, whereas in stage 1(b), FATA and NFCO are both significant (although FATA has a negative sign, contrary to expectations). The LOC composite index is also significant in stage 1(c), although adding the quadratic term in stage 1(d) causes both to lose significance.

In stage 2, we introduce both O and L as predictors of MNE performance. Stage 2(a) appears to be a combination of stages 1(a) and 1(c) in that all variables significant in those regressions remain so. In addition, LNASSET now attains significance; however, it is negatively related to ROA, contrary to our expectations. Comparing stage 2(b) with a combination of stages 1(a) and 1(c) yields similar conclusions, as does a comparison of stages 2(c) with 1(d); i.e., the LOCSQ variable remains insignificant.

Stage 3(a) includes nine interaction terms, representing combinations of O*L. Because of the high VIFs, we do not interpret the individual coefficients; however, it is clear that most of the interaction terms are significant, as are almost all of the O and L variables. When we substitute the LOC composite index for the individual L variables, the interaction terms lose their significance as do all the O variables and the L index itself. This suggests that an index measure may be a poor method to test moderator effects.

In Table 3.3, we show the relationships between the O and L variables and performance as proxied by EMV. Note first that the R-squares range from a low of .0760 in stage 1(b) to a high of .4241 in stage 3(a), much

Table 3.1 Descriptive statistics and Pearson correlation coefficients

	No.	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 ROA	755	5.89	6.73	1														
2 EMV	755	1.57	3.24	0.35*	1													
3 RDS	755	100	0.04	0.11*	0.46*	1												
4 SGAS	755	100	0.13	0.29*	0.37*	0.60*	1											
5 LNASSET	755	100	1.25	−0.11*	−0.34*	−0.22*	−0.33*	1										
6 FSTS	755	100	0.17	0.08*	0.03	0.26*	0.34*	0.14*	1									
7 FATA	755	100	0.14	0.02	−0.04	0.04	0.22*	0.12*	0.82*	1								
8 NFCO	755	100	9.74	0.15*	−0.00	0.13*	0.28*	0.45*	0.51*	0.46*	1							
9 OECD	755	100	0.16	−0.06	0.09*	0.04	−0.15*	−0.33*	−0.29*	−0.23*	−0.65*	1						
10 LOC	755	100	4.91	0.15*	−0.00	0.13*	0.28*	0.45*	0.54*	0.49*	1.00*	−0.65*	1					
11 LOCSQ	755	100	1000.99	0.15*	−0.00	0.13*	0.28*	0.44*	0.54*	0.48*	1.00*	−0.65*	1.00*	1				
12 DERATIO	755	100	96.82	−0.18*	−0.18*	−0.23*	−0.17*	0.32*	−0.17*	−0.09*	0.07*	−0.04	0.07	0.07	1			
13 FOOD	755	0.09	0.28	0.19*	−0.00	−0.26*	0.11*	0.00	−0.04	0.01	−0.03	−0.04	−0.03	−0.03	0.11*	1		
14 WOOD	755	0.07	0.26	−0.11*	−0.11*	−0.21*	−0.20*	−0.01	−0.13*	−0.03	−0.14*	0.15*	−0.14*	−0.14*	0.09*	−0.09*	1	
15 CHEM	755	0.32	0.47	0.20*	0.05	−0.02	0.05	0.24*	0.11*	0.07	0.24*	−0.28*	0.24*	0.24*	−0.07	−0.21*	−0.19*	1
16 METAL	755	0.06	0.24	−0.11*	−0.07*	−0.19	−0.24*	−0.05	−0.04	0.05	−0.00	−0.05	−0.00	0.00	−0.02	−0.08*	−0.07	−0.17

Note: Asterisks denote pairwise correlations where $p < .05$.

Table 3.2 MNE performance and multinationality: ROA regression results

	O	L	LOC	LOC + LOCSQ	O + L	O + LOC	O + LOC + LOCSQ	O + L + O*L	O + LOC + O*LOC	O + LOC + LOCSQ + O*LOC
	1(a)	1(b)	1 (c)	1(d)	2(a)	2(b)	2(c)	3(a)	3(b)	3(c)
RDS	0.29				−5.51	−1.04	−1.69	15266.18*	−104.69	−84.87
SGAS	11.04***				8.67**	7.54**	7.71**	7520.22***	56.64	29.44
LNASSET	−0.34				−0.83**	−0.79**	−0.81**	839.10***	−2.29	−5.88
FSTS		2.98			2.03			3750.83		
FATA		−7.86*			−8.33*			20004.07**		
NFCO		0.19***			0.21***			−136.61H		
OECD		7.07***	6.20**	6.22**	6.96***	5.78**	5.91**	5.58**	5.93**	5.89**
LOC			0.29**	0.54		0.30***	1.80		−56.42	−63.87
LOCSQ				0.00			−0.01			−0.01
FSTS*RDS								38.88		
FSTS*SGAS								−76.53**		
FSTS*LNASSET								0.15		
FATA*RDS								−192.54*		
FATA*SGAS								1.01		
FATA*LNASSET								−8.59**		
NFCO*RDS								0.9		
NFCO*SGAS								0.42H		
NFCO*LNASSET								0.05*		
LOC*RDS									1.05	0.84
LOC*SGAS									−0.40	−0.22

Table 3.2 continued

	O	L	LOC	LOC + LOCSQ	O + L	O + LOC	O + LOC + LOCSQ	O + L + O*L	O + LOC + O*LOC	O + LOC + LOCSQ + O*LOC
	1(a)	1(b)	1 (c)	1(d)	2(a)	2(b)	2(c)	3(a)	3(b)	3(c)
LOC*LNASSET									0.01	0.05
INTERCEPT	−1092.35	−230.62	−642.58***	−669.24**	−312.92	−1173.01	−1284.63**	−2362373.00***	4413.81	5286.1
NO OF OBS	755	755	755	755	755	755	755	755	755	755
R SQ	0.2006	0.1862	0.1737	0.1738	0.238	0.2212	0.2223	0.2999	0.2228	0.2242
F DIST	21.52***	15.42***	18.03***	16.90***	18.64***	20.44***	19.79***	9.49***	14.57***	19.55***

Notes: Asterisks show significance levels using a 2-tailed t-test where H < .10, * < .05, ** < .01, *** < .001. Control variables are not reported.

Table 3.3 MNE performance and multinationality: EMV regression results

	O	L	LOC	LOC + LOCSQ	O + L	O + LOC	O + LOC + LOCSQ	O + L + O*L	O + LOC + O*LOC	O + LOC + LOCSQ + O*LOC
	1(a)	1(b)	1 (c)	1(d)	2(a)	2(b)	2(c)	3(a)	3(b)	3(c)
RDS	33.20***				33.32***	32.68***	33.21***	10941.97**	292.00***	302.17***
SGAS	−0.31				−0.48	−0.92	−1.06	1245.43*	−20.32	−34.29H
LNASSET	−0.72***				−0.78***	−0.80***	−0.78***	174.85**	−11.21***	−13.05***
FSTS		1.46			−2.35H			10531.56*		
FATA		−2.96			0.29			1774.76		
NFCO		0.04*			0.05***			19.66		
OECD		3.48**	3.20**	3.07**	1.80*	1.62*	1.51H	1.06	1.19	1.17
LOC			0.06**	−1.56**		0.07**	−1.15**		232.03***	228.21***
LOCSQ				0.01**			0.01**			−0.01H
FSTS*RDS								−72.45		
FSTS*SGAS								−31.72***		
FSTS*LNASSET								−1.18		
FATA*RDS								−36.21		
FATA*SGAS								19.10H		
FATA*LNASSET								−0.64		
NFCO*RDS								−0.43		
NFCO*SGAS								0.18*		
NFCO*LNASSET								0.06***		
LOC*RDS									−2.63***	−2.73***

Table 3.3 continued

	O	L	LOC	LOC + LOCSQ	O + L	O + LOC	O + LOC + LOCSQ	O + L + O*L	O + LOC + O*LOC	O + LOC + LOCSQ + O*LOC
	1(a)	1(b)	1 (c)	1(d)	2(a)	2(b)	2(c)	3(a)	3(b)	3(c)
LOC*SGAS									0.2	0.34*
LOC*LNASSET									0.11***	0.12***
INTERCEPT	−3216.65***	−201.13*	−323.90**	−150.22	−3184.22**	−3263.36***	−3172.83***	−1236045.00**	−26166.60***	−25718.64***
No of Obs	755	755	755	755	755	755	755	755	755	755
R SQ	0.3127	0.0822	0.0760	0.0816	0.3262	0.3177	0.3208	0.4241	0.3646	0.3661
F statistic	12.67***	7.29***	8.85***	9.91***	14.27***	15.22***	20.19***	7.64***	11.04***	10.40***

Notes: Asterisks show significance levels using a 2-tailed t-test where H < .10, * < .05, ** < .01, *** < .001. Control variables are not reported.

greater variation than in the ROA regressions. All the regressions have F statistics that are significant at $p < .0001$. In stage 1, we examine the independent effects of O and L. Stage 1(a) shows that RDS and LNASSET are both significant, although LNASSET is negative (as it was in the ROA regressions). In stage 1(b), only NFCO is significant. LOC is positive and significant in stage 2(c). When the quadratic term LOCSQ is added in stage 1(d), the sign on LOC changes and the LOCSQ variable is significant. This suggests that, in terms of EMV, there is a nonlinear relationship between multinationality and performance. Note, however, the large drop in predictive power in the three location-only regressions (stages 1(b, c and d)) where no ownership advantages are present, as compared to the other EMV runs. This suggests that ownership advantages are important predictors for EMV.

In stage 2, when both O and L variables are included, as in the ROA regressions, the results are a combination of stages 1(a) and 1(b), with the exception that FSTS is now significant (although negatively related to EMV, contrary to our hypothesis). Stage 2(b) is similarly a combination of stages 1(a) and 1(c), with LOC again having a positive sign. Lastly, in stage 1(c) we see a nonlinear relationship between multinationality and performance.

In stage 3, we add the interaction terms between the O and L (or LOC) variables. Four of the nine moderator O*L terms in stage 3(a) are significant, as are all the O variables; however, only FSTS is significant among the L variables and even OECD loses its significance. When LOC is substituted for the individual L components in stage 3(b), two of the three moderators are significant as is LOC; however, the R-squared drops compared to stage 3(a). The addition of LOCSQ in stage 3(c) suggests again that the relationship between LOC and EMV is nonlinear.

Discussion

The purpose of our research is to develop a theoretically based model of the relationship between multinationality and firm performance. Using the OLI paradigm, we have developed five hypotheses about this relationship. We explore each in more detail below.

Our first hypothesis is that the three ownership advantages – knowledge-based assets (RDS), economies of common governance (LNASSET) and monopolistic advantages (SGAS) – should have direct and positive impacts on firm performance. We first test this hypothesis by examining the O variables in equations (1a) and (2a–c) in Tables 3.2 and 3.3. In general, the SGAS and LNASSET measures are significantly related to ROA, although LNASSET has a negative sign. In the EMV regressions, RDS and

LNASSET are significant, and LNASSET again has a negative sign. This suggests that knowledge-based and monopolistic advantages have a positive, direct impact on MNE performance. The common governance variable, however, appears to have a negative impact.

To further explore this relationship, we tried a quadratic form of LNASSET (available on request). In the ROA regression, adding the squared term causes the coefficients for LNASSET and its square to become insignificant. In the EMV regressions, however, both LNASSET and its square are highly significant, suggesting a U-shaped relationship.[16] We conclude that economies of common governance may only be a positive advantage for the largest MNEs in our sample.

We next performed a Wald test of the joint significance of our linear hypotheses about the O advantages. These results are reported in rows 1 and 2 of Table 3.4, which shows the change in F statistic from adding the O variables in stage 1(a) and in a comparison of stages 2(a) and 1(b). The F test results show that O advantages are direct, important explanatory variables of performance.[17]

Based on all these tests, we conclude that ownership advantages do independently and positively contribute to MNE performance, providing positive support for H1.

Our second hypothesis is that the three location components – foreign market penetration (FSTS), foreign production (FATA) and country scope (NFCO) – should be significant and positive predictors in equations 1(b) and 2(a) in Tables 3.2 and 3.3. First, note that FSTS is generally not significant. FATA also performs poorly; the coefficient is negative in the ROA regressions and not significant elsewhere. The negative sign is surprising since we anticipated that all L components would be positively correlated with ROA. Our third location variable, NFCO, is the best performing in terms of hypothesis 2 as its coefficient is positive and significant. A Wald test of the joint significance of the three L variables clearly shows that they positively contribute to MNE performance (see rows 3 and 4 of Table 3.4).

One reason for the mixed results on the L variables may be statistical. In our data set, FATA and FSTS are highly correlated although the low VIFs in all equations suggest that multicollinearity is not a problem. To further explore this issue, we ran separate regressions (available on request), each with one L variable for ROA and EMV in stages 1(b) and 2(a). Only NFCO was positive and significant in all four regressions; the coefficients on FSTS and FATA, on the other hand, were not significant in seven of the eight regressions. When NFCO was included with either FSTS or FATA, the foreign share variable became significant and negative. This implies that FSTS and FATA are only important once breadth of multinational involvement is taken into account; then, conditional on NFCO being at its

Table 3.4 Does multinationality matter?

No.	stages compared	Significance test	Change in F statistic	
			ROA	EMV
H1: Ownership matters				
1	S1(a)	Contribution of O variables	17.85 ***	26.64 ***
2	S2(a) – S1(b)	Contribution of O variables	19.91 ***	23.51 ***
H2: Location matters				
3	S1(b)	Contribution of L variables	14.31 ***	2.76 *
4	S2(a) – S1(a)	Contribution of L variables	15.56 ***	5.29 **
5	S1(c)	Contribution of LOC	24.45 ***	7.38 **
6	S2(b) – S1(a)	Contribution of LOC	29.68 ***	10.40 **
H3(a): Ownership moderates the relationship between MNE performance and location advantages				
7	S3(a) – S2(a)	Contribution of all moderators	5.03 ***	11.68 ***
8	S3(a) – S2(a)	Contribution of RDS moderators	2.71 *	5.13 **
9	S3(a) – S2(a)	Contribution of SGAS moderators	7.32 **	4.14 **
10	S3(a) – S2(a)	Contribution of LNASSET moderators	8.22 ***	19.68 ***
H3(b): Location moderates the relationship between MNE performance and ownership advantages				
11	S3(a) – S2(a)	Contribution of all moderators	5.03 ***	11.68 ***
12	S3(a) – S2(a)	Contribution of FSTS moderators	5.64 **	9.74 ***
13	S3(a) – S2(a)	Contribution of FATA moderators	3.87 **	1.67
14	S3(a) – S2(a)	Contribution of NFCO moderators	5.71 **	15.62 ***
15	S3(b) – S2(b)	Contribution of LOC moderators	0.60	10.72 ***
H4: Individual measures of multinationality are superior to an index measure				
16	S1(b) vs S1(c)	Comparison of L variables vs LOC	3.32 *	1.74
17	S2(a) vs S2(b)	Comparison of L variables vs LOC	4.56 *	2.81 H
H5: The relationship between MNE performance and location advantages is non-linear				
18	S1(d) – S1(c)	Contribution of LOCSQ	0.03	8.03 **
19	S2(c) – S2(b)	Contribution of LOCSQ	1.32	7.90 **
20	S3(c) – S3(b)	Contribution of LOCSQ	1.65	3.23 H

Note: Significance of change in F is reported as H < .10, * < .05, ** < .01, *** < .001.

mean, the impact of either depth variable on MNE performance is significant and negative. We therefore conclude that breadth is more important than depth as a contributor to MNE performance, as argued by Allen and Pantzalis (1996). In summary, our analysis of the location components provides positive but mixed support for H2.

Using moderated regression analysis, we can test whether O moderates L (Itaki, 1991) or L moderates O (Morck and Yeung, 1991) or O and L interact to positively affect MNE performance (Dunning, 1993a). Due to the high multicollinearity induced by the interaction terms, generally we cannot interpret the signs on the variables in stage 3(a). It is interesting to note that in the ROA regression all the O variables and two of the three L variables are significant. In the EMV regression, all three O advantages and FSTS are significant.

The Wald test can be used to measure the joint significance of the interaction terms. These results are reported in Table 3.4. We perform two sets of tests. The first groups the nine interaction variables into three subgroups of O advantages and then tests the significance of each O advantage as a moderator variable. We find strong support in rows 7–10 for the joint significance of RDS, SGAS and LNASSET as moderators. We then sort the nine interaction terms into subgroups of L advantages. As reported in rows 11–14, with the exception of FATA in the EMV regression, there is strong evidence that location advantages also moderate the relationship between O and performance. The joint conclusion we reach from these two tests is that O and L synergistically provide additional and positive contributions to MNE performance over and above their individual contributions. That is, MNEs with strong ownership advantages gain additional rents from their location advantages, over and above multinationality *per se*, and vice versa. Thus, H3 is supported.

In order to determine whether a composite index of multinationality performs better than its individual components, in stages 1(c), 2(b) and 3(b) we substitute our composite index, LOC, for the individual L variables. Generally, the coefficient on LOC is significant and positive in both ROA and EMV regressions, suggesting that an index can be a useful measure of multinationality. However, in order to properly test which method is superior (the composite or its components), we test the combined linear constraints imposed by the principal components analysis used to construct LOC. These results are shown in rows 16 and 17 of Table 3.4. Interestingly, the individual L variables are superior to the LOC composite index in three of the four cases. This may be an artefact of the method used to compute the LOC variable. On the other hand, since each variable is subject to some measurement error, it may simply be that a composite variable compounds these measurement errors and the resulting

'noise' obscures the multinationality–performance relationship. We conclude that H4 receives mixed support.

Lastly, we test whether the relationship between multinationality and performance is curvilinear by adding a squared term, LOCSQ, in stages 1(d), 2(c) and 3(c). In the ROA regressions, the term is not significant, implying that the ROA–LOC relationship is positive but linear. On the other hand, in the EMV regressions the relationship is clearly nonlinear. In stage 1(d), the coefficients for LOC and LOCSQ imply a U-shaped relationship, bottoming out well below the minimum LOC value in our sample, and then rising. In stage 2(c) where ownership advantages are present, we find a similar U-shape.

Given these surprising results, we conducted a second test (available on request) using piecewise linear regression, following Riahi-Belkaoui (1998). The LOC–ROA relationship was positive but linear; however, four of the five LOC segments in the EMV regression had significant coefficients, first positive, next negative and then positive. Since the coefficients are the slopes of the EMV–LOC relationship, conditional on all other variables being at their mean values, these EMV piecewise linear regressions provide further evidence that the multinationality–performance relationship is U-shaped for our sample firms.

These results are somewhat surprising given other studies that found an inverted-U relationship. One explanation might simply be differences in data sets, variables and empirical tests. Hitt, Hoskisson and Kim (1997) and Riahi-Belkaoui (1998), for example, use measures of multinationality that are based on foreign sales; since our LOC measure is a composite, this may explain why our LOC–ROA results are different. However, Gomes and Ramaswamy (1999) use a composite measure similar to ours, but still find an inverted-U shape. The conflicting results might be explained by the fact that their regression equations include no ownership or control variables.

A second explanation might lie in the individual L components. Allen and Pantzalis (1996, p. 645) explain the inverted-U shape as the result of too much depth (within-country expansion) relative to breadth (cross-border expansion). Building on this insight, we individually regressed quadratic forms of all three location variables on ROA and EMV to see whether individual L variables were linear in their relationships with firm performance. These results (available on request) show that FSTS and NFCO are linearly related to ROA. FATA, on the other hand, has the traditional inverted-U shape, implying that the returns to foreign production presence taper off. In the case of EMV, however, five of the six quadratic terms (all but FSTS in stage 1(b)) are positive, suggesting increasing returns to both depth (NFCO) and breadth (FATA and FSTS), at least in the presence of ownership advantages.

Why should multinationality be nonlinear and increasing in its relation with EMV, but not with ROA? Our third explanation is that EMV measures long-run expected performance of the firm, taking into account both intangible and tangible assets. EMV is a proxy for Tobin's q, which captures the potential rents from the firm's intangible assets. ROA, on the other hand, is more directly related to short-run financial performance based on the firm's capital assets. That is, EMV is future oriented, while ROA is past oriented. In this sense, EMV better captures the *potential* benefits from multinationality, particularly when the firm also has high ownership advantages. If this were the case, then one would expect that the returns to multinationality might be more closely tied to EMV than to ROA. To the extent that our conjecture is correct, this suggests that even the largest US multinationals may not have exhausted the returns from increasing the depth and breadth of their international operations. The long-run expected market returns from multinationality may be much larger than the short-run financial returns.

Lastly, the theoretical argument for an inverted U-shaped relationship is not that clear cut. The static and dynamic gains from exploiting cross-border differences in resources, markets and capabilities should, in theory, taper off, but the level at which this occurs for an individual firm is not apparent. The costs and risks of multiple authorities, values and cultures should rise as their number and diversity increases. However, as the MNE becomes more familiar with its existing pattern of affiliates and countries, the liability of foreignness should fall, encouraging further expansion of the MNE network. In addition, over time innovations reduce transportation and communication costs, permitting a non-trivial increase in the optimal degree of multinationality for all firms. Thus, one might expect the net benefits to vary across a cross-section of MNEs, with net benefits tapering off for the most multinationalized group, but as time passes, the average optimal degree of multinationality should increase.

CONCLUSIONS

This study used the OLI paradigm to explore the impacts of multinationality on firm performance. Our study contributes to this literature in several ways. First, we developed a theoretical model of the benefits and costs of multinationality, linking multinationality to MNE performance through the OLI paradigm. We reinterpreted the 'L' in OLI as *firm specific, not country specific, advantages*. We decomposed L into three components, two measuring depth (foreign market penetration and foreign production presence) and a third breadth (country scope). Second, using a data set of US

manufacturing MNEs in 1990–94, we found that O and L advantages both independently and interactively affect MNE performance, thus providing one of the first empirical tests of the OLI paradigm. Third, we found that a composite index of multinationality was generally inferior to its individual components. Fourth, we found that the net benefits of multinationality are positively related to financial performance, but taper off. Long-run market performance, however, continues to demonstrate positive net benefits even at high levels of multinationality, perhaps because it is more sensitive to ownership advantages. Our research therefore provides support for Dunning's recent observation that 'more attention needs to be given to the importance of location per se as a variable affecting the global competitiveness of firms' (Dunning, 1998, p. 60).

NOTES

1. This solves the level-of-analysis problem that has plagued the OLI paradigm, where O and I are conceptualized as firm-level advantages whereas L advantages are country level.
2. His five components are FSTS, FATA, the ratio of overseas subsidiaries to total subsidiaries, top managers' international experience, and psychic dispersion of international operations.
3. UNCTAD, in the *World Investment Report*, also uses a composite measure based on the average of the unweighted sum of three ratios (foreign assets to total assets (FATA), foreign sales to total sales (FSTS), and foreign employment to total employment (FETE)). Foreign assets are treated as the primary indicator of multinationality, with the top 100 MNEs being ranked by the size of their foreign asset holdings. See, for example, UNCTAD (2001a).
4. Tallman and Li (1996) test the ratio of foreign sales to total sales and the number of foreign countries, however, only number of foreign countries (breadth) is positively related to performance.
5. Note that, unlike Hitt, Hoskisson and Ireland (1994) and Gomes and Ramaswamy (1999), we do not see economies of scale and scope as locational advantages but rather as ownership advantages, based on the separation of O from L in the OLI paradigm.
6. Gomes and Ramaswamy (1999) develop a similar index for their study of the multinationality–performance relationship, but do not compare its effectiveness with the individual measures.
7. EMV is computed as (market value of equity + book value of debt – total assets)/total sales (Allen and Pantzalis, 1996, p. 638).
8. We also tested several other measures of firm performance (available on request). The regression results for ROS (return on sales), ROE (return on equity) and EPS (earnings per share) are similar to those for ROA, as were those for MVA (market value-to-assets ratio) to EMV. Therefore, we report only ROA and EMV. A principal components factor analysis shows that the performance variables load on two measures: the first we call short-run financial performance (ROA, ROS, ROE and EPS) and the second, long-run expected market performance (EMV and MVA), with no unique factors. The Cronbach's alpha for all five measures is .8155, suggesting they represent one common category.
9. We tested whether the three measures were congruent, using Cronbach's alpha. The value was .6538, suggesting positive support for grouping these variables as measures of ownership advantage.

10. R&D expenditures have one major limitation as an O measure; i.e., the total dollar outlays must be expended immediately whereas the revenues from R&D occur much later in time. Thus, RDS is likely to be more highly related to firm performance measures that are long run in nature and take intangible assets into account in the firm's market valuation, such as Tobin's q or EMV.
11. We wanted to use advertising expenses; unfortunately, there were many missing values. Rather than assume firms that do not report advertising expenses engage in no advertising, as do Morck and Yeung (1991, p. 170, fn.15) or delete these firms completely, we substituted SGAS.
12. Allen and Pantzalis (1996) use the log of NFCO as their breadth measure; however, in our analysis the logged form of NFCO performed poorly and we therefore used the more traditional measure. Because of the difficulty in collecting data on the number of foreign affiliates and foreign countries, we collected data for 1994 only. Thus, NFCO varies by firm but not by year in our data set.
13. NFCO has been used by Morck and Yeung (1991), Allen and Pantzalis (1996), Mishra and Gobeli (1998) and Gomes and Ramaswamy (1999), among others. Also, in early tests, we found that the degree of multicollinearity between NFCO and NFA was very high and dropped NFA from our empirical tests.
14. We also used factor analysis to develop a second index, finding similar results although the weights were quite different. Lastly, we created a third composite index that included OECD as a fourth component; however, its performance was marginally inferior to LOC and the Cronbach's alpha lower. We also developed a second composite measure that included OECD; however, it was marginally inferior to LOC.
15. The primary SIC codes reported by each firm were grouped into the following categories: FOOD (food, textiles, leather and other, SIC 20–3, 31 and 39), WOOD (wood and paper products, SIC 24–7), METAL (primary and fabricated metals 33–4), CHEM (chemicals, SIC 28–30 and 32) and MACH (machinery and equipment, SIC 35–8). The 755 observations were split as follows: FOOD (65), WOOD (55), METAL (45), CHEM (242) and MACH (348). In order to maximize heterogeneity across the industry dummies, we computed individual Cronbach's alphas, dropping a different industry each time. Dropping MACH (the largest category) resulted in the lowest alpha so MACH was chosen as the omitted variable.
16. In stage 1(d), the coefficients for LNASSET (−99.193) and its square (0.491) imply that the relationship reaches its minimum at LNASSET = 101.01. For MNEs with LNASSET above 101.01 (the top 20% of firms in our sample), the relationship is positive. The results were almost identical for stage 2(a).
17. The CNSREG program in STATA 6.0 estimates constrained linear regression models but does not compute the change in F statistic. We thank Christopher Baum at Boston College for writing a program to solve this problem, which is now available on the STATA website.

Extending the Eclectic Paradigm in International Business

Essays in Honor of John Dunning

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