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CONDITIONAL INTERACTION BETWEEN DOMESTIC AND FOREIGN BUSINESS IN THE MNC

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Abstract

This study reexamines the Multinational Corporations' (MNC) motives for going abroad. A model is presented examining the conditions under which business abroad supplements or substitutes domestic business for the MNC. By doing so, this study contributes to the theoretical understanding of the Multinational Corporations' business.

INTRODUCTION

This paper presents an approach which has received very little attention in the literature regarding the Multinational Corporation (hence, MNC): this study reexamines the motive of an MNC for investing abroad, from a perspective of supplementation and substitution effects that such decisions have on the MNC's business.

REVIEW OF THE LITERATURE

Numerous studies in the last three decades examined the economic motives of the MNC for direct foreign investment overseas (Hymen [26], Vernon [57], Kindelberger [32], Caves [7], Buckley and Casson [5] and Dunning [8]) offered theories of imperfections in national and international markets for products and factors of production, as preconditions for most direct foreign investments. Those studies suggested that some imperfections were due to government policies, while others were market-specific, culture-specific or firm-specific. Furthermore, MNCs were found to enjoy competitive advantages (relative to non-MNCs) such as: (1) economies of scale arising from their larger size (Horst [24]), Wolf [60]); (2) managerial and marketing expertise (Servan-Schreiber [50]); (3) utilization of super technology owing to their heavy emphasis on research and development (Gruber, Metha and Vernon [20]); (4) MNCs moving the production of the product abroad when the life cycle of that product matures and competition forces the MNC to find cheaper production abroad in order to survive (Caves [7], Vernon [57], Moxon [44]); (5) financial strength, portfolio diversification, risk reduction and access to financial sources (Eiteman and Stonehill [9], Lloyd, Gadstein and Rogow [39]); (6) differentiated products: Caves [7] suggested that firms create their own firm-specific advantages by producing and marketing differentiated products. If costs of a product benefit from economies of scale, or if the product involves a propriety process, licensing of foreign firms may be preferred. However, if the firm has a competitive advantage in marketing, managerial expertise, research (see also No. 3 earlier), expansion may be in the form of foreign investment. (7) Search for know-how: technological and management know-how can sometimes be obtained more easily through international acquisitions, than through other means, as noted by Eiteman and Stonehill [9]; (8) Haendel [22] adds to this list also the consideration of merging political risks, which include currency controls, tax discrimination and regulatory policy (all of which can be negative or positive for international acquisitions) as well as the outright risk of nationalization or expropriation of foreign entities. Such a risk may enduce full or partial acquisition of a domestic company in the target country rather than operation there under a foreign banner.

Other theories offered motives which go beyond the direct economic advantage, such as "Follow the Leader Theory," "Credibility" with customer and competitors, "Growth" abroad in order to survive at home, and "Follow the Customer" (Eiteman and Stonehill [9]).

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The mere existence of imperfect markets and competitive advantages for oligopolistic firms was viewed (by Buckley and Casson [5]) as a necessary but insufficient condition for direct foreign investment. For the latter to occur the competitive advantages have to be firm-specific, not easily copied, and to be transferable to their foreign affiliates. Thus, Buckley and Casson [5] and Rugman [49] offer a theory of internalization. This theory predicts that research-intensive firms which possess proprietary information or processes can create an internal market for that information or process in their multinational system (internalizing their advantages), particularly when sale of this information or product to outsiders is less advantageous. The MNC would thus prefer to produce abroad rather than merely export. Eiteman and Stonehill [9] note that direct foreign investments may be a defensive move in order to survive, as well as an aggressive move to capitalize on market imperfections. They report that the foreign investment decisions are often motivated by a strong stimulus from the external environment or from within an organization on the basis of personal biases, needs, and commitments of interested participants. Carr and Robinson [6] argued that the MNC provides a proxy for international portfolio diversification which the MNC can do more efficiently than the individual investor. Errnunza and Senbet [10] show that costless international corporate intermediation through direct foreign investment restores perfect market type results by undoing barriers to international capital flows faced by individual investors.

The view that market imperfections provide profitable opportunities to international capital investors is also examined in a recent study by Gultekin, Gultekin and Penati [21]. Their study confirms the evidence that such imperfections provide unusual returns to risk, and attribute these imperfections to government-caused segmentation. They point out that in the last two decades there has been a movement towards globalization of capital markets and elimination of some of the imperfections. This would result in reduced risk premiums to the investor who attempts to exploit such imperfections.

Eun [11] points out that international funds, as well as other opportunities to invest in foreign-country-specific funds and other arrangements, enable the individual investor to obtain a direct international diversification, often producing as good or better results compared to those of the MNC. Such international portfolio diversification provides an investor with superior returns compared to a domestic portfolio, although part of this may be due to the measurement problems of the CAPM application to international portfolios (Stultz [55], Giovani and Jorion [16], Stockman and Hernandez [53], Gultekin, Gultekin and Penati [21]). Fatemi [14] reported that in his sample of MNCs for the period 1971--80, the shareholders of MNCs which operate in competitive foreign markets experience negative abnormal returns. Under regular markets, MNC and domestic U.S. firms hence, (UMC) provide the shareholders identical returns and risk. He also reports that the monthly betas of MNCs are more stable and fluctuate less than those of UMC, indicating risk diversification. However, risk-adjusted returns in the MNC were smaller than in the UMC.

An explanation that supplements the MNC motives mentioned earlier, was offered by Porzecanski [48]. Porzecanski suggested that firms expand internationally in order to replace lost business at home or in order to enhance their domestic business. This suggestion is echoed and further developed in my paper in the next section, where a formal model is presented, outlining the conditions for substitution and supplementation effects of direct investing abroad by the MNC. My approach assumes that the MNC’s decision to invest abroad is analogous to a firm’s decision to bid for another firm, with some qualifications relevant to the international arena. Jensen and Ruback [29] and Jarrell, Brickley and Netter [28] identify the following sources of gains from such bids:

1. Risk reduction through diversification.
2. Synergistic benefits when the sum is bigger than its components, in vertical or horizontal integration.
3. Undervaluation---the target had assets which were unrecognized in the marketplace and the bidder is able to capture those assets at a bargain price.
4. The target firm had bad management which failed to exploit the resources of the firm. The bidder installs a better management team and thus extracts more wealth from the target firm.

These arguments can be related to exploiting market imperfections and risk diversification motives which were mentioned earlier in this section. Within this context, the MNC in my paper treats the foreign investment decisions as a special case of a merger problem, where the acquired foreign risky asset is either substituting or enhancing the business at home.

THE MODEL

The model describes a MNC whose revenues come from two sources: domestic and foreign assets. These assets carry risks, which may or may not be interrelated. These risks concern the MNC because of their relative contribution to its overall risk exposure. If the MNC cannot meet its obligation to creditors, they will step in and dissolve the MNC or fire its management. Similarly, if profits fall below some rate of return required by investors, the latter will fire the management. The MNC's management, therefore, perceives overall risk in this static model as the probability that current revenues will be insufficient to meet all current liabilities. The rate of return required by investors is externally determined (by alternative investments elsewhere for example), for the known risk level of the MNC. The MNC has risky assets L_1 abroad and L_2 at home. Those assets produce yields ℓ_1 and ℓ_2, respectively, and the uncertain recovery ratios of those assets are $\tilde{x}_1$ and $\tilde{x}_2$ ($0 \le \tilde{x}_1 \le 1$, for $i = 1,2$) with density functions $\phi(\tilde{x}_1)$ and $\phi(\tilde{x}_2)$, respectively. The MNC also has riskless investments (cash, etc.) yielding a rate g, and owes liabilities, D, with a cost rate of d. The investors provide capital, K, and expect that their wealth will be maximized by the MNC. (Agency problems are ignored here.) The firm's balance sheet constraint is $L_1 + L_2 + G = D + K$. If we lump all risky assets together, the profit function is defined as:

Definition a

$$\tilde{\pi} = L\ell\tilde{x} + gG - dD,$$

and the MNC is defined in this model as bankrupt when $\tilde{\pi} \le 0$. The MNC is assumed to have access to global sources of capital D in its preferred currency, and is assumed to not distinguish between their origins. Now, let us define also $\hat{\pi} = 0$, as the bankruptcy threshold, where:

Definition b

$$\hat{\pi} = L\ell\hat{x} - dD + gG = 0.$$

Thus the critical x for the bankruptcy threshold is defined as:

Definition c

$$\hat{x} = (dD - g\,(D + K - L)) / L\ell \qquad = (d - g)D + (L - K)g / L\ell$$

or

Definition d

$$x = \frac{g}{\ell} + \frac{D(d-g) - gK}{\ell L}$$

where $G = D + k - L$ from the budget constraint has been substituted into equation (c). In this model, the MNC exists as long as $\tilde{x} \ge \hat{x}$. The probability for this existence is:

$$0 \le \int_{\hat{x}}^{1} \phi(x)dx \le 1,$$

and the probability for bankruptcy is:

$$\int_{0}^{\hat{x}} \phi(x)dx = 1 - \int_{\hat{x}}^{1} \phi(x)dx .$$

Bankruptcy here occurs when $\tilde{\pi} < 0$, namely when total current receipts on risky and riskless assets are insufficient to pay total current interest on liabilities. The expected value of:

$$\tilde{x},\ \int_{0}^{1} (x)dx,$$

has to be greater than $\hat{x}$ for positive profits to exist. Therefore, the MNC has to push $\hat{x}$ down.

The MNC in this model maximizes shareholders' wealth in the following constrained, single-period model, where shareholders (providers of K) get a positive return only over the range of non-bankruptcy (namely, the bankruptcy procedures are assumed to reduce shareholder returns to zero):

Equation 1

$$\max \hat{\hat{\pi}} = \max E(\tilde{\pi} \mid \tilde{x} \geq \hat{x})$$

Equation 2

$L_1 + L_2 + G = D + K$ (balance sheet constraint.)

We can define the following function incorporating the balance sheet constraint via substitution for G, as follows:

Equation 3

$$\hat{\hat{\pi}} = \left(\ell L \int_{\hat{x}}^{1} \phi(x) dx + g(D + K - L) - dD \right)$$

Taking first order conditions we get:[1]

Equation 4

$$\frac{\partial \hat{\hat{\pi}}}{\partial L_1} = \ell \int_{\hat{x}}^{1} \phi(x) dx \cdot \frac{\partial L}{\partial L_1} - g \cdot \frac{\partial L}{\partial L_1} + \ell L \cdot \frac{\partial}{\partial L_1} \int_{\hat{x}}^{1} \phi(x) dx = 0$$

and

Equation 5

$$\frac{\partial \hat{\hat{\pi}}}{L_2} = \ell \int_{\hat{x}}^{1} \phi(x) dx \cdot \frac{\partial L}{\partial L_2} - g \frac{\partial L}{\partial L_2} + \ell L \frac{\partial}{\partial L_2} \int_{\hat{x}}^{1} \phi(x) dx = 0.$$

Subtracting equation (4) from equation (5) and eliminating g, we get:

Equation 6

$$0 = 0 + \frac{\ell L}{\frac{\partial L}{\partial L_1}} \cdot \frac{\partial}{\partial L_1} \int_{\hat{x}}^{1} \phi(x) dx - \frac{\ell L}{\frac{\partial L}{\partial L_2}} \cdot \frac{\partial}{\partial L_2} \int_{\hat{x}}^{1} \phi(x) dx.$$

After canceling out L and rearranging, we get:

Equation 7

$$\frac{\partial L}{\partial L_1} \Big/ \frac{\partial L}{\partial L_2} = \frac{\partial}{\partial L_1} \int_{\hat{x}}^{1} \phi(x) dx / \frac{\partial}{\partial L_2} \int_{\hat{x}}^{1} \phi(x) dx$$

ASSUMPTIONS

Risk for an MNC consists of many components (political risk, exchange risk, business risk and portfolio risk). The model assumes that ultimately these risks are viewed through their impact upon the firm's survivability. Furthermore, survival in this single-period model is assumed to require positive earnings $\tilde{\pi} > \hat{\pi}$. Otherwise, the firm is assumed to be bankrupt and dissolved; admittedly, these are rather strong assumptions.

Furthermore, the MNC views its overall global risky investments as generating the following revenues overall:

Definition e

$$L\ell\tilde{x} = L_1\ell_1\tilde{x}_i + L_2\ell_2\tilde{x}_2$$

so that the distribution of $\tilde{x}$ is assumed to depend on the weights $L_1\ell_1 \div L\ell$ and $L_2\ell_2 \div L\ell$ and on the distributions of $\tilde{x}_1$ and $\tilde{x}_2$. The MNC is considering the effects that investments L_1 and L_2 have on its overall profitability and survival. The value $D(d - g) - gk$ in definition (e) is assumed negative (namely $Dd = g(D + K) < 0$) which implies that the total costs of borrowed funds are assumed to be less than the "hypothetical" risk-free return on all the funds available to the MNC; otherwise, there will be no borrowing. Consequently, in the R.H.S. of equation (d), L (positive) in the denominator implies that a bounded solution for $\hat{x}$ exists in L (thus $[D(d - g) - gk] \div \ell L$ is negative and increasing L will increase $\hat{x}$, namely increase risk). The yield on risky assets ℓ_1 and ℓ_2 are assumed to be risk-adjusted and market-determined (a specific CAPM or multifactor market model can be implied but is not necessary for the solution of this model). Finally, the firm regards g as given exogenously, and adjusts its D and L. Furthermore, it is assumed that the MNC has access to global sources of funds at a universal rate d, and can borrow any amount D, after the firm determined its optimal L_1 and L_2. Although these may seem strong assumptions, they can be rather realistic for MNCs in today's global capital markets.

At optimal equilibrium (equation (7)), the MNC equates the ratio of the marginal changes in total assets from local and foreign markets to the ratio of marginal changes in the probability of survival. Let us examine equation (7) and the expression:

$$\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx.$$

By construction of the model, we defined:

Equation 8

$$x = \frac{g}{\ell} + \frac{D(d-g)-gk}{\ell L}$$

and, as L goes up $\hat{x}$ also gets larger.[2] Therefore the value of:

$$\int_{\hat{x}}^{1}\phi(x)dx$$

becomes smaller as its lower limit of integration is increased. Consequently,[3]

Equation 9

$$\frac{\partial}{\partial L}\int_{\hat{x}}^{1}\phi(x)dx < 0.$$

Therefore also:

Equation 10

$$\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx < 0$$

and also:

Equation 11

$$\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx < 0.$$

In equation (7) the right hand side has a positive sign (two negative numbers divided produce a positive number). Consequently, also on the left side both the numerator and the denominator must be of identical sign. Hence on the left-hand side of equation 7 we must have:

Equation 12

$$\frac{\partial L}{\partial L_2} > 0 \text{ and } \frac{\partial L}{\partial L_1} > 0$$

or

Equation 13

$$\frac{\partial L}{\partial L_1} < 0 \text{ and } \frac{\partial L}{\partial L_2} < 0.$$

Now examine the expression $\frac{\partial L}{\partial L_1}$ since:

Equation 14

$$L = L_1 + L_2$$

Therefore:

Equation 15

$$\frac{\partial L}{\partial L_1} = 1 + \frac{\partial L_2}{\partial L_1}$$

and

Equation 16

$$\frac{\partial L}{\partial L_2} = 1 + \frac{\partial L_1}{\partial L_2}.$$

Substituting into equation (9) we get:

Equation 17

$$\frac{1 + \frac{\partial L_2}{\partial L_1}}{1 + \frac{\partial L_1}{\partial L_2}} = \frac{\frac{\partial}{\partial L_2} \cdot \int_{\hat{x}}^{1} \phi(x)dx}{\frac{\partial}{\partial L_1} \cdot \int_{\hat{x}}^{1} \phi(x)dx}$$

Consequently,

Equation 18

$$\Rightarrow \frac{\partial}{\partial L_1}\int_{\hat{x}}^{1} \phi(x)dx + \frac{\partial L_2}{\partial L_1} \cdot \frac{\partial}{\partial L_1}\int_{\hat{x}}^{1} \phi(x)dx = \frac{\partial}{\partial L_2}\int_{\hat{x}}^{1} \phi(x)dx + \frac{\partial L_1}{\partial L_2} \cdot \frac{\partial}{\partial L_2}\int_{\hat{x}}^{1} \phi(x)dx$$

and

Equation 19

$$\Rightarrow \left[\frac{\partial L_2}{\partial L_1} \cdot \frac{\partial}{\partial L_1}\int_{\hat{x}}^{1} \phi(x)dx - \frac{\partial L_1}{\partial L_2} \cdot \frac{\partial}{\partial L_2}\int_{\hat{x}}^{1} \phi(x)dx\right] + \left[\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1} \phi(x)dx - \frac{\partial}{\partial L_2}\int_{\hat{x}}^{1} \phi(x)dx\right] = 0$$

The marginal change in overall risk (in the left-hand brackets), therefore is equal to zero or is positive or negative, depending on the following conditions:

Equation 20

$$\frac{\partial L_2}{\partial L_1}\cdot\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx-\frac{\partial L_1}{\partial L_2}\cdot\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx=0\text{, or}$$

Equation 21a$_1$

$$\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx-\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx=0\text{, or}$$

Equation 21a$_2$

$$\frac{\partial L_2}{\partial L_1}=\frac{\partial L_1}{\partial L_2}$$

Equation 21a$_3$

$$\frac{\partial L_2}{\partial L_1}/\frac{\partial L_1}{\partial L_2}=\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx/\frac{\partial}{\partial L}\int_{\hat{x}}^{1}\phi(x)dx.$$

The left-hand side of equation 19 is positive if the following condition exists:

Equation 21b

$$>0\text{ iff }\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx-\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx<0$$

or it is negative if the following condition exists:

Equation 21c

$$<0\text{ iff }\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx-\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx>0$$

Relaxing the assumption that $\ell_1=\ell_2$:

Taking the first derivatives of equation (3),

$$\hat{\hat{\pi}}=(\ell_1 L_1+\ell_2 L_2)\int_{\hat{x}}^{1}\phi(x)dx+g(D+K-L)-dD$$

(and remembering that $L = L_1 + L_2$), we get the following first order conditions:

Equation 22

$$\frac{\partial\hat{\hat{\pi}}}{\partial L_1}=\ell_1\int_{\hat{x}}^{1}\phi(x)dx-g+(\ell_1 L_1+\ell_2 L_2)\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx=0$$

and

Equation 23

$$\frac{\partial\hat{\hat{\pi}}}{\partial L_2}=\ell_2\int_{\hat{x}}^{1}\phi(x)dx-g+(\ell_1 L_1+\ell_2 L_2)\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx=0$$

Subtracting equation 24 from equation 23 and rearranging, we get:

Equation 24

$$0=\int_{\hat{x}}^{1}\phi(x)dx(\ell_1-\ell_2)+(\ell_1L_1+\ell_2L_2)\left(\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx-\frac{\partial}{\partial L_2}\int_{\hat{s}}^{1}\phi(x)dx\right)$$

so that:

Equation 25

$$\frac{\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx-\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx}{\int_{\hat{x}}^{1}\phi(x)dx}=\frac{\ell_1-\ell_2}{\ell_1L_1+\ell_2L_2}$$

This condition states that the MNC will equate at the margin the weighted marginal risk contribution from foreign investments (left-hand side of equation 25) to their marginal yield contribution (right-hand side of equation 25). This would be consistent with risk-neutral behavior.

OUTCOME

We obtain in equations (20)-(21c) a set of special cases: If equations (21a), ($21a_2$) or ($21a_3$) are true, the impacts cancel each other out and no change in overall risk occurs. If equation (21b) is true, then it requires that:

Equation $21b_1$

$$\frac{\partial L_2}{\partial L_1}>\frac{\partial L_1}{\partial L_2}>0$$

Similarly, if equation (21c) is true, then it requires that:

Equation $21c_1$

$$\frac{\partial L_2}{\partial L_1}<\frac{\partial L_1}{\partial L_2}<0$$

Implications:

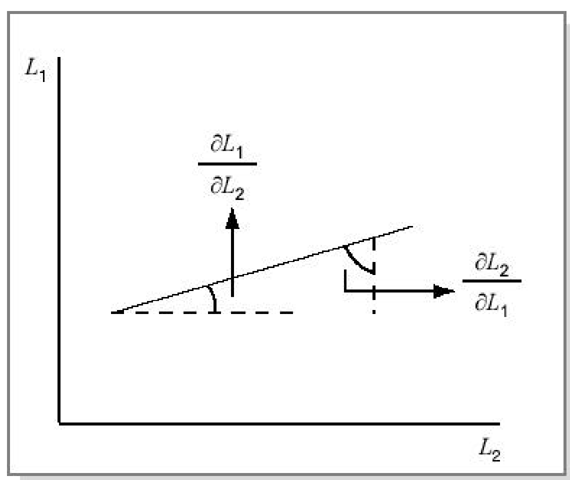
a) L_1 and L_2 are supplementing each other: In equation (21b) we have supplementation when:

Equation $21b_2$

$$\frac{\partial L_2}{\partial L_1}>\frac{\partial L_1}{\partial L_2}>0 \text{ (as shown in Figure 1)}$$

but this implies for known properties of supplementation, that:

FIGURE 1
Supplementation



Equation 21b$_3$

$$\frac{\partial L_2}{\partial \ell_1} < \frac{\partial L_1}{\partial \ell_2} < 0 \forall \frac{\partial L_2}{\partial \ell_1} < 0 \text{ and } \frac{\partial L_1}{\partial \ell_2} < 0$$

or, restating in absolute terms, we get:

Equation 21b$_4$

$$\left|\frac{\partial L_2}{\partial \ell_1}\right| > \left|\frac{\partial L_1}{\partial \ell_2}\right|$$

and

Equation 21b$_5$

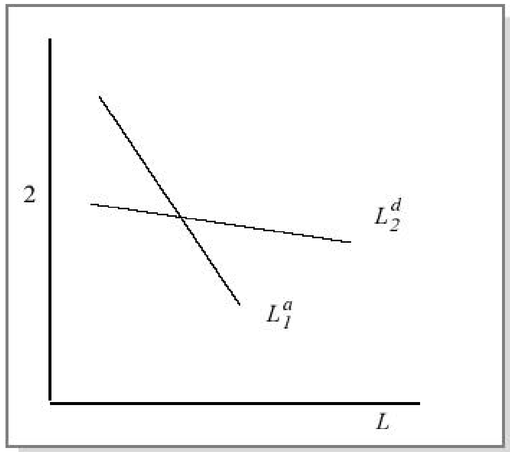
$$\left|\frac{\partial L_2^d}{\partial \ell_2}\right| > \left|\frac{\partial L_1^a}{\partial \ell_1}\right| \forall \frac{\partial L_2^d}{\partial \ell_2} < 0 \text{ and } \frac{\partial L_1^a}{\partial \ell_1} < 0$$

Consequently,

Equation 21b$_6$

$$\frac{\partial L_2^d}{\partial \ell_2} < \frac{\partial L_1^a}{\partial \ell_1} < 0$$

FIGURE 2
Investment Opportunities Abroad and at Home, With Supplementation



Note that L_1^a and L_2^d define investment opportunity functions abroad and at home, respectively, and $\partial L_2^d / \partial \ell_2$ and $\partial L_1^a / \partial \ell_1$ describe slopes of investment opportunities at home and abroad. Thus, the multinational firm goes abroad (under the supplementation case) when the investment function at home is less steep than that abroad, as shown in Figure 2.

The MNC will go abroad under these conditions only if asset growth abroad enhances asset growth at home as shown in equation (21b$_2$). For this enhancement, domestic asset function $L_2^{d'}$ would have to be less steep than L_1^a abroad. This supports the synergism effect implied earlier by equations (21b) and (21b$_2$).

b) L_1 and L_2 substituting for each other: In equation (21c$_1$) we have substitution when:

Equation 21c$_1$

$$\frac{\partial L_2}{\partial L_1} < \frac{\partial L_1}{\partial L_2} < 0$$

(as shown in Figure 3), namely, when:

Equation 21c$_2$

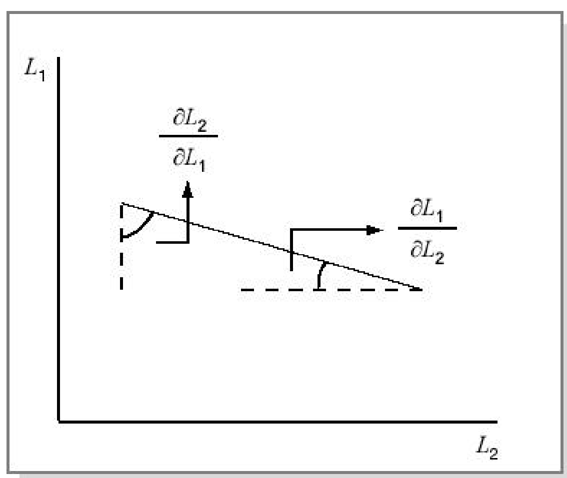
$$\left|\frac{\partial L_2}{\partial L_1}\right| > \left|\frac{\partial L_1}{\partial L_2}\right|$$

This substitution condition implies that:

Equation 21c$_3$

$$\frac{\partial L_2}{\partial \ell_1} > \frac{\partial L_1}{\partial \ell_2} > 0$$

FIGURE 3
Substitution



Since investment opportunity functions are assumed to be negatively sloping, namely $(\partial L_1 / \partial \ell_1) < 0$, and $(\partial L_2 / \partial \ell_2) < 0$, it follows that:

Equation 21c$_4$

$$\left|\frac{\partial L_2^d}{\partial \ell_2}\right| < \left|\frac{\partial L_1^d}{\partial \ell_1}\right|$$

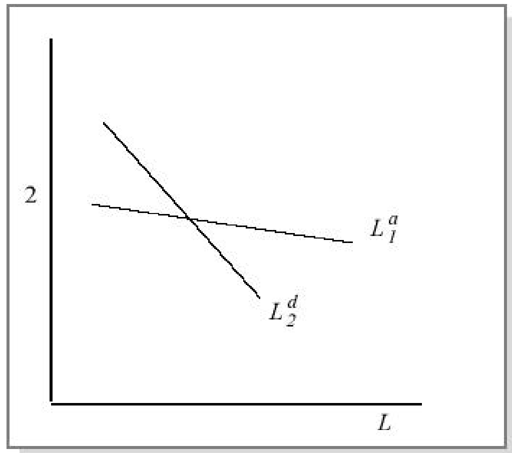
or

Equation 21c$_5$

$$0 > \frac{\partial L_2^d}{\partial \ell_2} > \frac{\partial L_1^a}{\partial \ell_1}$$

Figure 4 describes it graphically:

FIGURE 4
Investment Opportunities With Substitution



When interest rates are declining the MNC will go abroad because of the greater growth potential abroad, substituting it for domestic business. (No synergism is apparent here.) The opposite occurs when interest rates rise, for a given shift in supply of resources.

We can summarize these results into the following propositions:

1. When equation (21b$_5$) is true, asset growth abroad enhances growth at home.
2. When equation (21c$_5$) is true, asset growth abroad substitutes growth at home.

Risk

Equation (21b) implies for supplementing L_1 and L_2, the following condition:

Equation 21b$_6$

$$\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx < \frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx < 0$$

namely:

Equation 21b$_7$

$$\left|\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx\right| > \left|\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx\right|$$

foreign assets, L_1, have a larger (negative) effect on marginal safety than domestic assets L_2. This would imply that foreign assets are riskier than domestic assets. If we could separate the density functions we would get:

Equation 21b$_8$

$$\int_{0}^{\hat{x}}\phi_1(x)dx > \int_{0}^{\hat{x}}\phi_2(x)dx$$

where $\phi_1(x)$ is the density function of x abroad and $\phi_2(x)$ is the density function of x at home. Thus, the above proposition (I) should be modified as follows:

Proposition I′) When L_1 and L_2 are supplementing assets, the growth abroad supplements growth at home but marginal risk abroad is greater than marginal risk at home (thus ensuring a bounded optimal solution for L_1 and L_2).

As for substituting assets, from equation (21c) we have:

Equation 21c$_6$

$$0 > \frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx > \frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx$$

namely,

Equation 21c$_7$

$$\left|\frac{\partial}{\partial L_1}\int_{\hat{x}}^{1}\phi(x)dx\right| < \left|\frac{\partial}{\partial L_2}\int_{\hat{x}}^{1}\phi(x)dx\right|$$

Thus, if the density function could be separated, then we would get:

Equation 21c$_8$

$$\int_{0}^{\hat{x}}\phi_1(x)dx < \int_{0}^{\hat{x}}\phi_2(x)dx$$

Here risk abroad is smaller than risk at home. Proposition II should therefore be modified as follows:

Proposition II′) When L_1 and L_2 are substituting assets, (asset growth abroad substitutes for asset growth at home), marginal risk abroad is smaller than marginal risk at home.

In this case a bounded solution for L_1 and L_2 (except for "corner solutions") requires that $\ell_1 < \ell_2$. Otherwise, we get corner solutions (either L_1 or $L_2 = 0$). When $\ell_1 \geq \ell_2$ the MNC will move out of L_2 into L_1. Complete substitution or supplementation, however, is rare in real life. Rather, it is likely that some segments of the multinational firm's business enhance each other, while others exhibit substitution (due to personnel and other resource constraints). Thus, an in-depth analysis of each case is necessary if an appropriate decision is desired.

Business risk, political risk (such as expropriation for example) and currency risk are reflected in the expected yield from the foreign assets. This approach is consistent with Kelly's [31] empirical findings that multinational firms, in practice, combine all risks together in the final evaluation of foreign operations. The probability of political controls or seizure of foreign assets, the exchange rate fluctuations—all these effect the MNC's eventual yield from the foreign assets. The MNC therefore considers yield and risk from each source, foreign and domestic, in its overall global impact upon the MNC.

CONCLUSION

The model illustrates substitution and supplementation effects on the MNC from international diversification. Previous studies document conflicting evidence on the benefits of MNC's from such diversification. The model points out that benefits from the diversification would depend on the relative elasticity of the demand functions abroad and at home and derives the conditions for synergistic benefits to exist for the MNC from its foreign investment. Finally, the model suggests that international acquisitions can enhance the firm's willingness to undertake risk, compared to their pre-MNC status. Further studies are needed to explore the model's behavior under different sets of assumptions.

ENDNOTES

1. In equations (3) and (4) assume, for the sake of simplicity, that we do not distinguish between $_1$ and $_2$. This, however, is relaxed later on.

2. This is true as long as $d < g$. When $d > g$ it is assumed that there is no reason to hold $G > 0$. It is also true when $D(d - g) - gk < 0$ (see earlier assumptions).

3. The relation between foreign and domestic risks is determined by the sign of the elements on the left side of equation (7). Moreover L_1 and L_2 can be positively, negatively, or not at all, related to each other, as is shown later.

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APPENDIX

Exchange Rate Effect:

It should be noted that the properties of the model remain unchanged when it is modified specifically to include exchange rate $\tilde{\psi}$. ψ is uncertain and exogenous to the firm. Equation (1) will be rewritten in this case as:

$$\max E(\tilde{\pi}) = \max E\left\{\ell_1 L_1 \tilde{\psi}\int_{\hat{x}}^{1}\phi(x)dx + \ell_2 L_2\int_{\hat{x}}^{1}\phi(x)dx + g(D + K + L_1\tilde{\psi} + L_2) - d_1 D_1 - d_2 D_2 \tilde{\psi}\right\}$$

s.t. $L + G = D + K$

here we distinguish between business risk $\tilde{x}$ and exchange risk $\tilde{\psi}$, where $\tilde{\psi}$ is the exchange rate between currency 1 (the foreign currency) and currency 2 (the domestic currency). Note that by this construction the constraints remain unchanged. The firm still wants to constrain the business risk in each country, and still is subject to budget constraints. Clearly the overall currency risk is reduced as the diversification among the various denominations increases, and this portfolio effect is well known. However, there is another interesting point which should be noted in the context of this modified structure: We obtain in the objective function the product $E(\tilde{\varepsilon}_i, \tilde{\psi}_1)$, where $\tilde{\varepsilon}_i = \tilde{x}_i - E(\tilde{x})$, such that $E(\tilde{\varepsilon}_i) = 0$ for $i = 1,2$ (by construction). However, $E(\tilde{\varepsilon}_i, \tilde{\psi})$ equals the covariance (ε_i, ψ_1) since:

$$\operatorname{cov}(\tilde{\varepsilon}_i \tilde{\psi}_1) = E(\tilde{\varepsilon}_i, \tilde{\psi}_1) - E(\tilde{\varepsilon}_i)E(\tilde{\psi}_1),$$

but $E(\tilde{\varepsilon}_i)E(\tilde{\psi}_1) = 0$ because $E(\tilde{\varepsilon}_i) = 0$ by construction.

Consequently, the multinational firm should consider in its international operations also the covariance between the business risk (expressed by the disturbance $(\tilde{\varepsilon}_i)$) and the exchange risk expressed by the uncertain $\tilde{\psi}_i$, in each country in which it operates. When this covariance is positive, international operations may increase overall riskiness; when the covariance is negative, the firm’s overall riskiness is reduced, and when the covariance is zero the effect on profits is zero.

In every other aspect the analysis of equation (1′) is identical to that of equation (1) through the paper.