

# International Competitiveness and Policy in Dynamic Industries \*

## I. Introduction

Firms competing in industries in which costs related to technological change and product development can be substantial and in which market share can be sensitive to both changes in relative costs and changes in product design and appeal, must regard expenditure on these characteristics as necessary for maintaining or improving competitiveness: they are a "mandated" rather than discretionary expenditure. These industries, usually also characterized by rapid growth, are given the generic label of "dynamic industries".<sup>1</sup> Firms are assumed to seek to maximize market share, and a given firm's costs of maintaining market share are defined as its mandated investment expenditure. In dynamic industries such expenditure may be substantial and diverse since intra-industry competitiveness is significantly affected by the ability of individual firms to gain (or not to lose) a competitive advantage through updating capital equipment or product design more quickly or more efficiently than competitors in the face of technological change (broadly defined), through improvements in marketing-and-distribution organizations, or through expansions of capacity. The analysis thus applies only to industries where the rate of product change is high and continuing.<sup>2</sup> Moreover,

---

\* The authors are grateful to Kevin Chang, Bruce Elmslie, John Harvey, Toni James, Jan Kregel, Pedro Perez, Tom Pugel, Malcolm Sawyer and David Schwartzman for helpful comments. The usual caveat applies.

<sup>1</sup> Dynamic industries are thus characterized by Schumpeterian competition "which commands a decisive cost or quality advantage ... This kind of competition is as much more effective than [traditional competition] as a bombardment is in comparison with forcing a door ..." (SCHUMPETER, 1950, p. 87). Such an environment also figures prominently in PORTER's (1990) "advanced industries" and in DUNNING's (1979) analysis of foreign direct investment.

<sup>2</sup> An industry is defined here as competing in a market for a single family of goods. There can be substantial economies of scope among groups of goods and the analysis of

we assume that such industries are oligopolistic with an established leader and follower firms. The framework sheds new light on the role of state intervention in the promotion of the international competitiveness of domestic firms, and brings out the difficulty of formulating such a policy in the presence of multinational enterprises.

Because national government policies and economic structures can affect both the efficiency of firms' mandated investment expenditure activities and the amount of free cash flow available to domestic firms to finance mandated investment expenditure, government policy can have a direct effect on the international competitiveness of its industries. This approach permits better insights into how deliberate governmental policies (and "accidents") can improve or impair the competitiveness of national industries in global markets.<sup>3</sup>

Section II defines the concepts of "mandated investment expenditures" and "discretionary profits" for dynamic industries in a closed economy context, and presents a simple formalization for the follower-firm problem. In Section III we open the model up to international trade in goods and focus on the implication of government policies and national institutions. This section demonstrates how ostensibly domestic institutional behavior can affect international competitiveness through its effect on mandated investment expenditures. In section IV we consider mandated investment expenditures in a model of international trade in goods and factors of production, and especially the existence of multinational enterprises (MNEs). Section V provides a summary of the major results.

## II. Mandated Investment Expenditure in a Closed Economy

### *Basic Definitions*

Firms producing goods which have a product life or market share dependent on the rate of change of technology or product

mandated investment expenditure is applicable both to an industry comprising a single differentiated good or a family of such goods. Further, there exist inter-activity interdependencies (intra-industry economies) when an industry or a national economy is vertically integrated (*cf.* PORTER, 1990).

<sup>3</sup> The thrust of this paper is obviously related to, but more encompassing (and we argue more revealing) than, the issues covered in the strategic trade policy literature (summarized in KRUGMAN, 1986; HARRIS, 1989). See section IV below.

design achieved by their competitors (firms in "dynamic" industries), need to invest money and resources in the development of their own technological, design and production innovations lest they not be able to maintain their competitive position within their industry. In this section we measure competitive position in terms of market share, and define mandated investment expenditure (herein MIE) as the expenditure, in a given period, which is required by each firm if it is to maintain a constant market share.<sup>4</sup> MIE thus includes:

(a) expenditure on the full range of research and development (R&D) including product innovation, product development and process technology;

(b) net expenditure on new equipment installed to replace technologically obsolete or obsolescent equipment prior to its complete depreciation;

(c) investment in additional plant capacity needed to maintain the original capacity share in a growing industry;

(d) expenditure on marketing and distribution (M&D) developments needed to keep pace with competitors.

Item (c) includes such expenditure as preemptive innovation and investment in entry-detering capacity expansion, normally undertaken by the industry leader (Salop, 1979). MIE in the form of capacity expansion is a credible threat to potential entrants because of its irreversibility - unlike limit pricing strategies (Spence, 1977, p. 544). Such expansion may or may not require investment beyond the profit maximizing level (Spulber, 1981), but it is clearly irreversible. A high commitment to MIE activities within an industry will itself constitute a barrier to entry. Items (a) and (d) are investments in future efficiency: they are usually expensable for tax purposes and can therefore be straightforwardly regarded as costs of operation and maintaining competitiveness but, strictly, they constitute additions to intangible assets and could therefore be financed out of new issues of equity, debt or retained earnings. All MIE must be financed out of free cash flow (after-tax profits plus any non-cash charges) or out of liquid reserves (*e.g.* lines of credit, including newly-raised debt or equity).

<sup>4</sup> In subsequent sections, we measure international competitiveness in terms of world market share. In that context, MIE is investment expenditure by a nation's stable of firms in a given global industry (*cf.* RODRIGUEZ and CARTER, 1979, p. 427).

The link between currently generated free cash flow and the ability to meet mandated investment need not be binding over the short run except for relatively small or young firms with limited access to external funds. Formally:

$$MIE < P(1-g) + NCC + CRED \quad (1)$$

where: P = pre-tax accounting profits  
g = the average corporate profit tax rate  
NCC = non-cash charges  
MIE = mandated investment expenditure  
CRED = available credit

MIE is closely linked to firm profits. Define "discretionary profits" ( $P_d$ ) as accounting profits net of actual investment expenditure, that is, the amount of MIE actually undertaken:<sup>5</sup>

$$P_d = P(1-g) + NCC - AIE(1-ng) \quad (2)$$

where: P = discretionary profits  
AIE = actual investment expenditure  
n = the share of MIE which is allowed as expensible in the determination of  $P(1-g)$

For a firm to maintain its market share, AIE must equal MIE. In this case (2) can be rewritten as follows:

$$P_d = P(1-g) + NCC - MIE(1-ng) \quad (3)$$

Industry leaders determine the amount of mandated investment costs imposed on follower firms. The level of investment expenditure required by any firm depends on the leader firms' perceived rate of return on R&D expenditure, the length of the product life (*i.e.* the rate of technological change in product design and innovation), and on the expected growth rate of the industry.<sup>6</sup> An increase in the perceived rate of return on R&D is an *internal* stimulus to MIE

<sup>5</sup> In the open economy version, any surplus over MIE constitutes "discretionary profits" as national economic rents captured by a globally competing industry. See Sections III and IV below.

<sup>6</sup> The concept of MIE is thus closely linked to EICHNER's (1976) "corporate levy"; the amount of funds the firm desires to raise internally to meet its long-run investment needs. The MIE framework is consistent with Eichner's insistence that the corporate levy is not a residual but in fact is a key determinant of the pricing decision. Our analysis can be viewed as providing an explanation of why Eichner's "megacorps" assume their growth rate will be positive.

growth: an awareness that competitor firms are spending more or achieving better results in product development and innovation is an external stimulus to MIE.<sup>7</sup> The average expenditure by industry leader firms on market share maintenance and market share enhancement sets a target that follower competitors must match if they are to maintain their market shares in a given period. Generally, for the representative follower firm in a given industry:

$$MIE_{ij}^t = G(MIE_{ij}^t, MS_{ij}^t) \quad (4)$$

and

$$MS_{ij}^t = MS_{ij}^{t-1} (1-a_{ij}) (AIE_{ij}^t/MIE_{ij}^t) \quad (5)$$

where  $AIE_{ij}^t$  = actual investment expenditure by the  $i^{\text{th}}$  follower firm in industry  $j$  in period  $t$

$a_{ij}$  = degree of sensitivity of firm  $i$  market share to its relative investment expenditure<sup>8</sup>

$MIE_{ij}^t$  = leader firm MIE in industry  $j$  in period  $t$

$MS_{ij}^t$  = market share of firm  $i$  in industry  $j$  in period  $t$

Thus the percentage change in market share for a given follower firm from period  $t-1$  to period  $t$  can be expressed as follows:

$$\frac{\Delta MS_{ij}}{MS_{ij}^{t-1}} = \frac{[(1-a_{ij})AIE_{ij}^{t-1}] - MIE_{ij}^{t-1}}{MIE_{ij}^{t-1}} \quad (6)$$

$$\text{Moreover: } (\delta MS_{ij}^t / \delta AIE_{ij}^t) = \frac{MS_{ij}^{t-1} (1-a_{ij})}{MIE_{ij}^t} \cong 0 \text{ as } a_{ij} \cong 1 \quad (7)$$

$$\frac{MS_{ij}^t}{MS_{ij}^{t-1}} = \frac{(MS_{ij}^{t-1}) (1-a_{ij}) (AIE_{ij}^{t-1})}{(MIE_{ij}^{t-1})^2} \cong 0 \text{ as } a_{ij} \cong 1 \quad (8)$$

The one-period effect on market share of a follower firm's failure to maintain the level of MIE is expressed in (8). Since we expect  $a_{ij}$  to be less than 1, the effect is negative.

<sup>7</sup> PETERS (1988). Strictly internally-stimulated expenditure increases are not mandated but discretionary. For the rest of the paper, it is assumed that the stimuli are external and that the firm (or national industry) is responding to external (or foreign) rates of expenditure. The firm or industry is therefore a follower.

<sup>8</sup> Note that  $a_{ij}$  depends on both firm efficiency in imitation and market sensitivity overall for the industry.

The simple two-period formulation does not capture the potentially important lagged effects on the follower firm. Consider a firm which, because of bad managerial decisions, does not invest at the mandated rate but distributes the funds as dividends to shareholders. The firm's products now lose competitiveness in terms of both cost (loss of comparable gains in process technology and, possibly, a failure to replace obsolescent productive equipment) and customer failure (lack of comparable gains in product development and innovation); these competitive losses show up in the form of decreased market share and profits in the next period. The firm is then further handicapped: it is less able to fund the MIE determined for it by its competitors and these costs comprise both an ongoing differential and a catch-up component from the previous period.<sup>9</sup> An inevitable consequence (in addition to declining market share) is a reduction in the market value of the firm's equity and greater difficulty in obtaining external financing. The firm may be on a path to bankruptcy or being taken over by a larger viable firm or it may have to retreat to a market niche (a smaller and more specialized family of products) in which it is still technologically competitive and for which it can fund mandated investment costs.

This scenario shows the possible hysteretic effects of "falling behind". Assuming a firm has a cost advantage, it will earn above-normal  $P_d$ , allowing it to raise MIE without cutting  $P_d$  below its previous level.<sup>10</sup> Follower firms have two choices: (a) they may meet MIE and squeeze  $P_d$  in an effort to maintain market share; (b) they may opt to maintain  $P_d$  and risk falling behind technologically and otherwise and lose market share. If they choose (a) then the risk is serious decline in  $P_d$  and the ability to pay dividends and meet credit obligations. But if the follower firm chooses option (b), then its ability to regain its original level of  $P_d$  depends on its ability to attain the established level of  $MIE_j$  and to cut costs to match the leader firm.

<sup>9</sup> PORTER (1990) points out that the return on investment in products with short life-cycles is very sensitive to "speed to market" and, therefore, to the timeliness of product-development R&D expenditure.

<sup>10</sup> This situation recalls Steindl's (1976) monopolist. But while the dynamic in his model is to stagnation, this is only one possible outcome in our framework. Since we do not assume that a firm's leadership position is permanently guaranteed, especially in light of the potential asymmetries (intentional or not) across countries (discussed below), then the rate of MIE is likely to remain high. In contrast, for Steindl, "Oligopoly brings about a maldistribution of funds by shifting profits to those industries which are reluctant to use them" (STEINDL, 1976, p. XV).

A likely outcome is an intermediate one. Assume the leader firm gains a 10% cost advantage, and that this is translated into a 5% increase in both  $P_d$  and MIE, the rise in MIE leads potentially to future cost reductions of  $x\%$ . Follower firms face a reduction in  $P$  of 10%. They may choose to accept this by lowering MIE and  $P_d$  each by 5%. Unless the follower firm raises  $MIE_j$ , or unless it benefits from a government policy favoring firm  $i$  over other firms, a downward spiral of competitiveness - hysteresis - sets in. The firm would require a subsidy of  $10+x\%$  for it to return to the *status quo ante*. That is, an initial (exogenous) 10% cost advantage by the leader firm requires a greater than 10% efficiency gain to  $MS_j$  to be recaptured. The leader's new higher rate of profit will be capitalized into its equity price and the higher rate of retained discretionary profits allows further increases in MIE. Unless followers maintain AIE at the required rate, they will face declining market share. Increased  $x$ -efficiency may be a response.

### III. MIE and International Trade

Consider the case of international movements of goods, but not factors. This case is very similar to the closed economy case. But whereas in the closed economy framework we considered firms in a national market, now our unit of analysis is the national industry - a stable of firms - in a global market. The large role played in intra-industry competitiveness by MIE activities in dynamic industries and the need to be able to finance those expenditures implies that international differences in government policies and institutional frameworks can affect the competitiveness of national industries and deliberate measures can be construed as a variant of commercial policy. This intermediate case of goods trade allows us to highlight many of the important issues of government policy related to trade in terms of tariff and non-tariff protection, exchange market intervention and industrial policies involving tax policy and institutional policy innovations. In the subsequent section we look at the case of trade in goods and factors.

## Commercial Policies

An activist international trade policy by governments can conceivably raise national welfare by allowing firms to capture economic rents – current and future – previously captured by firms in other countries. Certain firms or industries can and do generate significant economic rents for the benefit of their national economies. Such firms, through positive technological spillovers to related and downstream industries, can also generate external economies which contribute to national income. Both directly-earned rents and the net benefits from spillovers can be combined here and referred to as “economic rents”. Such policies have become known as “strategic trade policies”. This policy conclusion is a variant of the optimum tariff argument which some see as an exception to the hands-off prescription of traditional international trade theory. In this section we use the MIE framework to assess the benefits of strategic trade policies and how such policies might be most effectively targeted. We show that the net benefit of such policies is directly related to the relevant industry’s degree of global market share sensitivity to relative investment rates,  $a_{ij}$ , where  $i$  now refers to the “stable of firms” from a country and  $j$  is the particular global industry.

In industries where actual or potential rents are available for market leaders and viable competitors, firms compete in global markets and a national economy benefits from the rents earned by its stable of firms. The market position of a firm (and therefore its share of industry rents) depends on its innate efficiency, on its ability to meet or exceed the required industry rate of MIE and partly on any international asymmetries which exist in the industry. International asymmetries imply the absence of a so-called “level playing field” and can be traced to national differences in commercial policies, overt or covert, and to differences in the legal, regulatory and tax conditions in different countries.<sup>11</sup> An activist policy by a government will allow

<sup>11</sup> PORTER’s (1990) “diamond” of competitive conditions addresses the asymmetry issue from a business strategy perspective. Note also that macroeconomic strategic policies must be distinguished from microeconomic or industry-specific policies. Macroeconomic strategic policies might include lower corporate tax rates, subsidies of R&D expenditure, the easy availability of lines of credit on less than competitive conditions and any other measures which might increase the ratio of discretionary to aftertax accounting profits for national firms.

for both kinds of asymmetry and will seek to advance the global market positions of its stable of firms in any rent-generating industry. This can be done either by enabling firms to become more efficient in MIE activities (by exempting firms in rent-generating industries from certain anti-trust restrictions, for example<sup>12</sup>) or by subsidizing MIE activities (either by increasing  $P$  by trade policies or by increasing  $P_d$  by tax credits), allowing increased  $P_d$ , and a potential expansion of market share-increasing activity, raising MIE for foreign firms. Rewriting equation (2) to include explicitly such an MIE subsidy:

$$P_d = P(1 - g) + NCC - MIE(1 - bng) \quad (9)$$

where  $b$  is the government subsidy to MIE activity (per dollar). Note that  $\delta P_d / \delta b = ngMIE_{t+1} > 0$ , that is increases in  $b$  raise  $P_d$  and thus the ability to undertake efforts to increase market share. The purpose of any initial activist policy (e.g. an increase in  $b$ ) is to provide a competitive edge to home-country firms in dynamic industries by reducing the rate of MIE for home-country firms or by increasing their  $P_d$  so that home-country firms may increase the required rate of MIE for foreign firms. Such measures “slant the playing field”: the longer the playing field remains slanted in a dynamic industry and the greater the MIE-sensitivity of the industry, the greater is the return on an activist policy measure. Home-country firms now become industry leaders and will only increase their AIE (and therefore raise MIE for foreign firms) if they deem the rewards to be attractive. An activist policy merely facilitates the assumption of market leadership, and possibly domination, by home-country firms: success depends upon the initiatives of the firms themselves.

The international division of rents is susceptible to the timing as well as to the existence of activist policies. The more MIE-sensitive the industry (i.e. the higher is  $a_{ij}$ ) the more quickly must foreign retaliatory measures be taken if the foreign industry is not to suffer a long-lasting reduction in market share. A credible threat of retaliation in a dynamic industry may serve the same goal as the traditional threat of tariff retaliation: it ensures that countries will not institute policies because they know that they will not generate any advantage. But, even for a country with no desire to launch activist policies, the

<sup>12</sup> In YAMAMURA’s (1986) interpretation, this was one of the major achievements of MITI.

time dimension in a dynamic industry makes quick retaliation essential. Rapid retaliation, of course, requires that facilitating authorization be in place. The existence of such authorization may in itself be a credible threat. This requires that dynamic industries be identified in advance and that limits to their protection be fully discussed for the class of industries rather than for any individual industry. Two factors which derive from the MIE approach have important implications for defensive policies. First, dumping in dynamic industries must be seen as predatory dumping. Safeguards have to be established so that home-country firms are not pushed into a vicious or downward spiral. The greater the industry's MIE-sensitivity, the greater the potential returns to dumping by the aggressor industry. Second, the pre-establishment of lines of credit for use for MIE activities by firms in dynamic industries will reduce the MIE sensitivity of an industry and will deter offensive action by a trading partner and rival.

What is crucial in the selection of industries for possible strategic intervention and certain retaliation is recognition of the fact that economic rents are tied to the ability of engineers and researchers in a national industry to have hands-on familiarity with the latest technologies in their industry (and in related industries) and with current research. This vital relationship is simply not incorporated in analyses of technologically-static, perfectly or imperfectly competitive industries.<sup>13</sup> Borrus *et al.*, (1986, pp. 110-112) extend this argument (crucially) to encompass linkages with upstream and downstream industries and to the relationship between competitiveness in one industry and in its related industries. What is necessary is not to be able to "pick the winners" but to recognize an industry or industries as being in a large technology cycle and to consider the potential return on strategic aid to such industries. It is vital to identify the distinction between the aggressive and the defensive dimensions of policy for such industries. Defensive (retaliatory) awareness and readiness could be vital.

Our analysis differs in a number of respects from the now-traditional Strategic Trade Policy literature. For one, the MIE approach precludes treating R&D expenditure as simply an ar-

<sup>13</sup> See BRANSCOMB (1989), GRAY (1985, pp. 137-140), and especially BORRUS *et al.* (1986, p. 93).

gument of the cost function, since there are interactions among firms within an industry which make the amount of such expenditure a matter of intra-industry competitive strategy. Second, the reaction functions typically specified in the STP literature posit a negative relation between duopolists' response to rival R&D expenditure.<sup>14</sup> Our model assumes a direct correlation, that is, increases in leader firm expenditure on market share enhancement raise MIE and tend to raise AIE. Finally, our results differ from those of Spencer and Brander (1983) and Dixit (1988). The hysteretic effect of a follower firm's failure to meet MIE<sub>f</sub> means that competitive advantage may widen or only shrink slowly. The zero-sum game of R&D expenditure, typical in the STP literature, is a positive sum game in the MIE approach since any "head start" that generates rents is maintained - the catching up is always longer than the falling behind.

#### *Currency Overvaluation*

The international competitiveness of firms and industries can be affected by differences in factors contributing either to a higher profit rate or to a lower rate of MIE. Exchange rate disequilibria can thus be a serious source of change in the international composition of market share. This section is concerned less with how the rate of MIE is initially established than with changes in global macroeconomic conditions, especially exchange rate disequilibria, since they have a direct impact on firms' ability to set new or meet existing MIE levels - that is, to compete over time in a global market.

Consider a dynamic industry with U.S. and rest-of-world (ROW) firms competing in both U.S. and foreign markets.<sup>15</sup> A disequilibrium exchange rate is defined as a level at which the balance of payments cannot be sustained in perpetuity. A protracted period of overvaluation of the U.S. dollar *vis-à-vis* foreign currencies puts ROW firms in a position to increase their commitments to the expansion of their market shares. Which strategy is to be adopted will depend very much on the degree of competition which exists among ROW firms

<sup>14</sup> See, for example, KRUGMAN (1983).

<sup>15</sup> We couch this subsection in terms of the United States and the "rest of world" because we believe it is an important factor in the loss of competitive position in advanced industries by U.S. firms.

in the various markets.<sup>16</sup> The tactic of cutting prices in the U.S. market and failing to raise them in ROW markets will, *ceteris paribus*, expand market share directly: raising prices (and per-unit mark-up) in ROW markets, and maintaining the selling price in dollars in the U.S. market, may lead to increased market share in the future as ROW firms can substantially increase expenditure on MIE activities. The most likely tactic is some combination of the two extreme positions but, no matter what the mix of tactics actually employed, ROW firms will have large and increased profits above existing MIE levels, and thus the ability to increase MIE for rival firms, at the same time that U.S. firms find their profits being squeezed and their profits net of MIE even more sharply reduced. Limited exchange rate pass-through can result from the pursuit of market share.<sup>17</sup>

If the currency overvaluation is sufficiently long-lasting, so that U.S. firms cannot maintain the required rate of MIE out of reserves or lines of credit, these firms will be forced to cut back on their rate of investment in MIE activities and thus lose market share. Overvaluation for an entire year might be a death blow for small, newly-formed U.S. firms, but presumably large and established firms would be able to maintain some positive rate of MIE activities. If ROW firms choose to increase their commitments to the expansion of their market shares, then the rate of MIE for U.S. firms is raised at a time when they, because of greater price competition in their markets, can least easily find the necessary financing.

The crux of the issue is the juxtaposition of the experience of ROW and U.S. firms. As U.S. firms suffer a reduction in profits net of MIE, ROW firms register a corresponding increase, as well as greater up-to-dateness of capital equipment. ROW firms may devote part of their above-MIE profits to additional R&D, to expanding marketing-and-distribution activities in the U.S. market, or to promoting brand loyalty for their products by holding constant the per-unit markup for a given quality in dollars. In any event, if U.S. firms seek to maintain market share during the period of overvaluation of the dollar, they must commit a greater percentage of profits to MIE activities than their foreign competitors (see the preceding section).

With an equal and opposite movement in the exchange rate, U.S. firms will find themselves worse off relative to the *status quo ante*. Their product development has lagged; their physical capital is

<sup>16</sup> See DORNBUSCH (1987).

<sup>17</sup> See FROOT and KLEMPERER (1989) for a game-theoretic approach.

less up-to-date than their foreign competitors', implying higher production costs for given reliability of product; and their balance sheets are weaker, probably implying heavier interest expense. The major difference may have occurred in market penetration. As a result, there is an asymmetry between the periods of dollar overvaluation and dollar adjustment. Because of the improvement of ROW firms' non-cost position during the period of dollar overvaluation, these firms are in a good position to limit the pass-through of adverse exchange rate changes (dollar depreciation), because they have already established low-cost production techniques and higher quality products and marketing and distribution networks. Even with an exact reversal in the exchange rate, U.S. firms will still be faced with a long period in which they must invest funds in MIE activities at a higher rate than their foreign competitors. For these firms, profits above MIE will remain low even after the currency overvaluation has been terminated.<sup>18</sup> If the industry size is permanently reduced, then the post-overvaluation rate of exchange must be lower than it would otherwise have been (in addition to any effect of the interest burden of the debt).<sup>19</sup> This is a case of hysteresis in international trade.

The MIE framework brings out the importance of non-cost factors in the exchange rate disequilibrium-trade balance link. Economists have largely ignored the changes in non-cost determinants of international competitiveness even though, as we have argued, they are inherent to periods of large exchange rate fluctuations around an equilibrium. These non-cost factors are neither captured in traditional macro (payments adjustment) models nor in the exchange rate pass-through literature. Thus it is not entirely surprising that the weakness of the response of the U.S. balance of trade to the dollar depreciation since 1985 was unpredicted by economists. Controlling for relative growth rates and the J-curve effect, predictions of current account improvement far exceed actual changes.<sup>20</sup>

This argument implies that because of the strong dollar in 1980-1985, ROW firms were in a position to raise MIE, allowing them to weather the storm of unprecedented dollar depreciation since

<sup>18</sup> The problem could be further exacerbated if U.S. firms lose good-quality personnel to other U.S. firms which do not compete with ROW competitors. Such losses will lengthen the time (and the cost in terms of MIE activities) needed to re-establish the original competitive position (always assuming that it can be re-established).

<sup>19</sup> This might explain the so-called "delayed J-curve". See ROSENSWEIG and KOCH (1988).

<sup>20</sup> See KRUGMAN and BALDWIN (1987, p. 18).

1985. For U.S. firms, the problem could have been countered, in part at least, if costs in dollars had been temporarily reduced by, for example, give-backs by employees. Alternative solutions are for some governmental assistance through a long-term loan or some measure of commercial policy to protect the home market. At the least, explicit recognition of the importance of a profit squeeze and the increased difficulty in meeting MIE adds another important reason to the loss of international net worth and higher interest costs for governments to be aware of the consequences of, and the need to avoid, appreciable currency overvaluation.

### Other Support Measures

Governments may choose to encourage firms in dynamic industries as a means of fostering growth in GDP.<sup>21</sup> The international implications of national policies which affect growth industries derive from differences in tax treatment of firms and from successful intervention. Such factors can be referred to as "dynamic-industry support measures" or "support". Their importance derives principally from the ability to fund MIE activities and the self-reinforcing effects of MIE on competitive advantage (*i.e.* on the vicious cycle on a national scale). They assume greater importance, the greater is  $a_p$ , the greater is the rate of technological change and the greater the degree or integration of world markets, that is under free and open trade.

International differences in support measures can affect the ability of national firms to appropriate, maintain and expand the quasi-rents that come from leadership in growth industries. While the "support" provided by government may be important in determining the nationality of the leading firms, it merely slants the playing field. Managerial commitment, ability and vision, the native ability of researchers, institutional characteristics of the economy, and the cost of capital (since most growth industries are also relatively capital-intensive) all contribute to firm leadership and to leadership maintenance.<sup>22</sup> A country can close out foreign firms by tariffs but this

<sup>21</sup> Aggregate demand management will also have an impact. In order to focus on microeconomic and international factors we implicitly assume no asymmetry in demand management policy across countries. Moreover, we ignore any bias in endogenous aggregate demand arising from potential industrial concentration. See note 10 above.

<sup>22</sup> For a review of how these features affect the performance of U.S. industry, see DERTOUZOUS *et al.* (1989).

policy will be self-defeating unless the needed R&D breakthroughs can be generated domestically. Given the need for hands-on experience with an awareness of the latest technologies, R&D breakthroughs are unlikely to come about in isolation. Access to the new technologies by local researchers is vital and can best be achieved by local manufacture of the products in which domestic forms are not efficient. Even then some subsidization of high-technology industry may be necessary and great care will be needed to ensure that there is a payoff to the endeavor within some reasonable time.

In terms of equation (1):  $MIE < P(1-g) + NCC + CRED$ . National differences in  $g$ ,  $NCC$  and  $CRED$  can provide a competitive edge since they have a positive effect on the free cash flow of the firms located in the country with the more favorable tax treatment. Tax treatment affects the relative magnitudes of  $g$  and  $NCC$ , and successful intervention will improve the efficiency of MIE. More favorable tax treatment allows firms either to raise the rate of MIE to their own strategic advantage or to make it more difficult for them to be "squeezed" by foreign firms which enjoy some technological advantage. Some countries go so far as to subsidize expenditure on R&D by allowing tax credits in excess of 100 percent of R&D expenditures (Australia, for example). While such a policy may be conceived by politicians as purely domestic, it may have severe international implications.<sup>23</sup>

Government-sponsored measures designed to increase the "efficiency" of expenditures on MIE activities are as important as differences in tax treatment. Foremost among these is the fostering of cooperation among the R&D endeavors of national firms and granting such cooperation immunity from anti-trust laws (Gray, 1979). The possibility that strict enforcement of domestic legislation might impair the performance of national firms in international markets was recognized in the United States in the passage of the Webb-Pomerene Export Trade Act in 1918 and, in banking activities, by the Edge Act. Probably the most effective organization to enhance

<sup>23</sup> The problem of unequal rates of taxation favoring one nation's firms over another is usually considered under the *aegis* of tax neutrality for subsidiaries of foreign multinationals competing with home country firms in a national market. KRAUSE and DAM (1964, pp. 44-56) distinguish between domestic tax neutrality where domestic investment is not favored over foreign direct investment, and foreign tax neutrality which levies the same rate of corporate tax on both indigenous firms and competing subsidiaries of home-country multinational subsidiaries. The latter condition is now usually referred to as "national treatment" and is not limited to questions of taxation. This analysis did not concern itself with competition among exporting firms confronting each other in national and third-country markets.



the efficiency of firms' R&D expenditure has been the Japanese Ministry of Trade and Industry (MITI). Yamamura (1986) suggests that MITI deliberately set out to "tinker creatively" so that the international competitiveness of Japanese firms would be improved. These factors can allow firms of a particular nation to gain a lead in a growth industry and to maintain and probably expand that lead, if the governments of competing firms do not match the supportive measures.

Institutional arrangements can also affect the ability of firms to increase MIE. Where local customs allow high debt/equity ratios and large long-term credits from the financial system, it becomes more difficult for firms to be "squeezed" out of competition by high rates of MIE.

#### IV. The Interaction between Mandated Investment and Multinational Enterprises

It is possible that effective control of production units in several countries by a single corporate entity (a multinational enterprise or MNE) could systematically ease any constraints on achieving MIE brought about by some adverse national circumstance, such as an overvalued currency. Alternatively, the existence of MNEs might preclude national policies from favoring home industries' share of the international market. Given these possibilities, both analysis and policy prescription should acknowledge the existence of MNEs. Do MNEs weaken the argument, made above, that factors which asymmetrically affect net free cash flow can, by holding AIE under MIE, affect competitiveness? The analysis is conducted in an international framework<sup>24</sup> and can best be considered under three headings: (i) does the existence of foreign subsidiaries release any cash-flow constraint on the parent company caused by an overvalued home-country currency? (ii) does the presence of foreign subsidiaries in a country weaken either the incentive of governments to institute or the effectiveness of policies designed to strengthen the national stable of firms?<sup>25</sup> (iii) does the hierarchical network of an MNE allow the

<sup>24</sup> A single MNE operating in a market would almost inevitably be the market leader.

<sup>25</sup> Recognition of one aspect of the implications for national policy of the presence of foreign subsidiaries is evident in KRUGMAN *et al.* (1989) and REICH (1990), where it is argued that domestic value-added rather than profits is the proper focus of policy.

corporation to exploit conditions in those countries in which greatest support for a value-adding or research activity exists?

(i) Self-evidently a cash constraint caused by the overvaluation of the home (parent-country) currency will be aggravated by the repatriation of a constant flow of profits from subsidiaries located abroad since a unit of foreign currency will convert to fewer units of the overvalued home currency (translation loss). Only if individual MNEs are able to take advantage of the currency misalignment to enhance the profits of their foreign subsidiaries by more than profits are reduced in home-country operations and in amounts sufficient to offset any translation loss, will foreign subsidiary activities provide an easing of the cash constraint caused by an overvaluation of the home currency (or vice versa). This does not seem to have been accomplished by U.S. multinationals in the early 1980s. Moens (1991) found that U.S. MNEs had total profits which were (statistically-significantly) negatively related to the strength of the dollar as well as to the share of total corporate assets located in weak-currency nations.<sup>26</sup> In other words, the translation loss outweighed any relocation of activity effect.

(ii) The presence of foreign subsidiaries in a country as part and parcel of the domestic industry may deter a government from trying to garner a larger share of global quasi-rents available in that industry. Clearly foreign-owned subsidiaries will benefit from policies which invoke national treatment because some of the benefits will accrue to foreign stockholders and because it seems probable that technological innovations can be transferred back to a foreign parent company quite quickly so that technological advantages could quickly spillover to foreign competitors of the domestically-owned firms in third-country markets.

The first point to make is that the return on a given home-country policy will depend upon the *proportion* of foreign ownership in the industry at the time the policy is put into effect and upon the amount of any induced inward foreign direct investment

<sup>26</sup> MOENS' empirical work was beset by difficulties caused by the paucity of the appropriate data at the firm level and by the fact that, where industry-level independent variables were used, some conglomerate corporations had activities which spread across more than one industry. In her ongoing research, LYNN ROY has found that foreign profits of 258 U.S. manufacturing MNEs between 1985 and 1990 measured in dollars were (statistically-significantly) negatively correlated with the strength of the dollar measured by the real exchange rate.

(FDI).<sup>27</sup> Second, how effective the policy is depends on who garners the quasi-rents: if the quasi-rents are likely to accrue in part to home-country national or nationally-owned related or supporting industries, the argument for the policy becomes stronger. Third, it should be possible to design policies which take the degree of foreign ownership into account: e.g. a reduced corporate tax rate could be applied only to (locally) reinvested profits.

(iii) the ability of an MNE to capitalize on differences in sources of national competitive advantage, whether governmentally-instigated or not, is limited, although in some instances the MNE will be able to transmit to its home country some of the sources of competitive advantage found abroad.<sup>28</sup> The benefits that accrue to the MNE organizational form are its ability to relocate production in line with an advantage in money costs<sup>29</sup> as well as out-of-phase cyclical factors and its ability to benefit from special conditions created by governments for certain activities. If the source of national advantage is perceived to be long-lasting, then the MNE can adjust the geographic distribution of its portfolio of real assets and locate activities (production and R&D) in the advantaged country. But even if the advantage is seen to be long-lasting there are other obstacles to such movement: an inhospitable climate for inward foreign direct investment, whether from government policy or from sheer cultural distinctiveness, and the need for an operation of sufficient scope that the advantages can be fully realized, i.e. where R&D is subsidized through some tax measure, there must be sufficient revenue generated locally to take advantage of that inducement and repatriation of the subsidy must be possible. If the source of national advantage is considered to be temporary (and the possibility of a matching policy in other countries makes any advantage potentially temporary), it is

<sup>27</sup> The small share of inward FDI in Japan makes this policy option more readily available for Japanese policy-makers: in 1988, Japan had net inward FDI totalling \$10 billion and outward FDI totalling \$111 billion (UNCTC, 1991, p. 32)

<sup>28</sup> For a detailed and insightful study of this ability couched in terms of Porter's diamond, see DUNNING (1992). It is important to distinguish between the ability of an MNE to harness and repatriate country-specific advantages (the issue in context) and that faced by Dunning which is the ability of MNEs to affect a country's diamond of competitiveness.

<sup>29</sup> Money-cost advantage is defined here as the ability to perform certain value-adding activities more cheaply (in some international *numéraire*) in one country than another: the expression is not equivalent to comparative cost advantage employed in most models of international trade which impose balanced trade as a prerequisite to full equilibrium.

extremely unlikely that an MNE will invest (move assets) to take advantage of the condition: then relocation of ongoing value-adding activities in line with the new conditions is possible but only if there is spare capacity in the subsidiaries.<sup>30</sup>

Relatively few (manufacturing) MNEs have more than fifty percent of their assets abroad<sup>31</sup> and even fewer would be willing to allow such a vital activity as core R&D activities to be distant from headquarters.

The existence of MNEs does not seem likely to impair seriously the interrelationship between the importance of net free cash flow and the ability to have AIE equal to MIE. Rather, it suggests that policies affecting domestic conditions governing firms in industries which generate quasi-rents will tend to be the same in all countries and the level will be determined by the "low bidder". Accidental departures from that rule, such as the overvaluation of the U.S. dollar in the early 1980s, will weaken firms located in the country in which adverse conditions exist.

## V. Conclusion

The concepts of MIE and discretionary profits throw valuable light on firm production and investment strategy and, in an international setting, on government policies towards dynamic industries; The proposed framework contributes to the analysis of national policies in its emphasis of the interdependence of firms' actual and future profit rates and, therefore, on the "how" of both offensive and defensive "creative industrial tinkering" (cf. Yamamura, 1986, p. 205). The MIE approach also shows the breadth of policy instruments

<sup>30</sup> An interesting example of this kind of activity was the contribution of the Mexican automobile industry to that country's balance of trade when the peso weakened substantially and local demand weakened in the face of draconian measures imposed on domestic demand. Between 1982 and 1987 the automobile companies in Mexico increased their net balance of trade by \$2.68 billion: most of this was achieved through channeling the output for the subsidiaries of Chrysler, Ford and General Motors to the United States.

<sup>31</sup> Roy's sample of established manufacturing MNEs (see note 26) showed an average ratio of foreign to total profits of 37% over the six-year period. Her data set is probably biased to include a disproportionate share of large corporations with relatively large proportions of total assets located in foreign countries.

which are available: "strategic trade policies", as defined by Krugman (1986), are something of a misnomer because they neglect so many relevant policy options. Moreover, strategic trade policies, such as import-restriction or export-promoting subsidies, tend to emphasize the role of economies of scale and economies of learning almost to the exclusion of the key relationships of a competitive edge in the timing and the ease of access to new and embryonic technologies by national engineers and scientists. This question becomes particularly important when an upstream industry has been severely weakened (through being unable to maintain the established rate of MIE) so that a block of technology is not available on equal terms. A nation cannot sacrifice one component of a vertically-integrated industry without effectively handicapping the others. Hysteresis in competitiveness, resulting from an exogenous cost shock to a single firm in a closed economy or an exogenous exchange rate change in an open economy, can be explained in this model as a function of the MIE cumulative causation process.

As the rate of technological innovation (both product and process) grows and industries become increasingly MIE-sensitive, the need for a thorough understanding of the difference between discretionary profits and traditional profits will become more important. Particularly in international trade policy, governments can no longer afford the luxury of a commitment to a hands-off policy for their sensitive industries. This does not mean that creative industrial tinkering is necessarily desirable: it does imply that passivity in the face of currency overvaluation and foreign creative tinkering can be very costly to both the industry and the national economy. Finally, the MIE framework reinforces the currently debated point that what is important for national competitiveness policy is not ownership of domestic production capacity but the value added by domestic operations in a given industry. To the extent that government assistance can be channelled to domestic operations and not just domestically-owned multinational capital, the policy prescriptions which follow from our analysis hold up, *a fortiori*.

New York

WILLIAM MILBERG - PETER GRAY

## REFERENCES

- BORRUS, M., TYSON, L., and ZYSMAN, J. (1986), "Creating Advantage: How Government Policies Shape International Trade in the Semiconductor Industry", in Krugman (ed.) (1986).
- BRANSCOMB, LEWIS M. (1989), "Technological Change and Its International Diffusion", in James Cassing and M. Husted (eds.), *Capital Technology and Labor in the New Global Economy*, The American Enterprise Institute for Public Policy Research: Washington, D.C. 103-113.
- DETOUZOUS, MICHAEL L., et. al. (1989), *Made in America: Regaining the Productive Edge*, MIT Press: Cambridge, Mass.
- DIXIT, AVINASH (1988), "A General Model of R&D Competition and Policy" *Rand Journal*, 19, 316-328.
- DORNBUSCH, RUDIGER (1987), "Exchange Rates and Prices", *American Economic Review*, 77, 93-106.
- DUNNING, JOHN (1979), "In Defence of the Eclectic Theory", *Oxford Bulletin of Economics and Statistics*, 41, 269-278.
- DUNNING, JOHN (1992), "Dunning on Porter: Reshaping the Diamond of Competitive Advantage", *Transnational Corporations*, Vol. I, Fall.
- EICHNER, A. (1976), *The Megacorp and Oligopoly*, Cambridge: Cambridge University Press.
- FROOT, KENNETH and KLEMPERER, PAUL (1989), "Exchange Rate Pass-Through When Market Share Matters", *American Economic Review*, 79, 637-654.
- GRAY, H. PETER (1979), "Needed: A Webb-Pomerene Act for Research?", *Challenge*, November-December, 58-60.
- GRAY, H. PETER (1985), "Free Trade or Protection: A Pragmatic Analysis", Macmillan, London.
- HARRIS, RICHARD (1989), "The New Protectionism Revisited", *Canadian Journal of Economics*, 22, 751-778.
- HATSOPOULOS, GEORGE, KRUGMAN, PAUL and SUMMERS, LAWRENCE (1989), "International Competitiveness: Beyond the Trade Deficit", *Science*, 241, July 15.
- KRAUSE, LAWRENCE B. and DAM, KENNETH W. (1964), *Federal Tax Treatment of Foreign Income*, Brookings Institution: Washington, D.C.
- KRUGMAN, PAUL R. (1983) "New Theories of Trade among Industrial Countries", *American Economic Review*, 73, 2.
- KRUGMAN, PAUL R., (ed.) (1986), *Strategic Trade Policy and the New International Economics*, MIT Press: Cambridge, Mass.
- KRUGMAN, PAUL R. and BALDWIN, RICHARD E. (1987), "The Persistence of the U.S. Trade Deficit", *Brookings Papers on Economic Activity*, 1, 1-55.
- MOENS, LUC (1991), "Exchange Rate Variations and US Multinational Corporations Profits: The Case of the 1980's," Unpublished Ph.D. dissertation, Rutgers University, New Brunswick, New Jersey.
- PETERS, LOIS (1988) "The Management of Technology: An Overview", *School of Management Working Paper*, Rensselaer Polytechnic Institute, Troy, New York.

- PORTER, MICHAEL (1990), *The Competitive Advantage of Nations*, The Free Press: New York.
- REICH, ROBERT (1990), "Who is Us?", *Harvard Business Review*, January-February.
- RODRIGUEZ, RITA and CARTER, E. (1979), *International Financial Management*, second edition, Prentice Hall: Englewood Cliffs, New Jersey.
- ROSENWEIG, JEFFREY A. and KOCH, PAUL D. (1988), "The U.S. Dollar and the 'Delayed J-Curve'", *Economic Review* (Federal Reserve Bank of Atlanta), 73, 2-15.
- SALOP, STEVEN (1979), "Strategic Entry Deterrence", *American Economic Review*, 69, 335-338.
- SCHULTZE, CHARLES L. (1983), "Industrial Policy: A Solution in Search of a Problem", *California Management Review*, 25, 5-15.
- SCHUMPETER, J. (1950), *Capitalism, Socialism, Democracy*, third edition, New York: Harper and Row.
- SPENCE, A. MICHAEL (1977), "Entry, Capacity, Investment and Oligopolistic Pricing" *Bell Journal of Economics*, 8, 534-544.
- SPENCER, BARBARA (1986), "What Should Trade Policy Target?", in Krugman (1986).
- SPENCER, BARBARA and BRANDER, JAMES (1983) "International R&D Rivalry and Industrial Strategy", *Review of Economic Studies*, 50, 707-722.
- SPULBER, DANIEL (1981), "Capacity, Output and Sequential Entry", *American Economic Review*, 71, 503-514.
- STEINDL, J. (1976), *Maturity and Stagnation in American Capitalism*, New York: Monthly Review Press (originally published in 1952).
- U.N. CENTRE ON TRANSNATIONAL CORPORATIONS (1991), *World Investment Report 1991: The Triad in Foreign Direct Investment*, New York: United Nations.
- YAMAMURA, KOZO (1986), "Caveat Emptor: The Industrial Policy of Japan", in Krugman (1986).