National Support Policies for Strategic Industries: The International Implications

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1. Introduction

Once upon a time, according to a story international trade theorists like to tell each other, there was a paradise in which everybody lived efficiently, producing and trading whatever was demanded in the most efficient combination. Then an angel came along and stamped on each person's forehead a different colour – a kind of national flag – allowing him or her to produce and trade only with capital and land of the same colour. The diaspora that followed led to large differences in efficiency across the world, and to a huge world welfare loss. Since that unhappy moment, trade theorists (by definition economists with a world rather than national welfare vision) have been trying to show how to get back to paradise.

The first main "road back" had been paved by classical economists: their idea was that despite a country's poor efficiency, there could be gains in welfare if the country specialised in those products/industries in which it was relatively most efficient. Such gains were mainly based on the application of division of labour principles to an international world. The neo-classical extension of this line of analysis more formally introduced "factor endowments" that indicated a country's comparative advantage and established a number of crucial links with factor-price equalisation, income distribution and growth. In terms of our parable, it could be said that trade theory explained how, through free trade, paradise could be re-established all over the world despite national differences in "factor endowments".

There is no doubt that international trade has been one of the main engines of growth in the postwar period. With the continuous liberalisation of trade, world trade flows increased over the period 1950 to 1975 by more than 500 per cent, compared with an increase in world output of only 200 per cent. However, despite the success of institutions such as the GATT in developing a stable, liberal and non-discriminatory trade system which came to dominate ever larger areas of
manufacturing, trade theorists themselves began to question the theoretical basis underlying such trade flows.

First of all, empirical trade analysts found it increasingly difficult not to be surprised by the large portion of trade flows which did not fit "pure" trade theory explanations. These findings, described as the Leontief paradox, seemed to be a clear evidence of the limits and limited value of pure trade theory in a world dominated by more realistic imperfect competition phenomena. The unease with the existing theoretical trade framework became a standard opener in trade analyses. Bhagwati, writing some twenty years ago, put it as follows: "the realistic phenomena...such as the development of new technologies in consumption and production involve essentially phenomena of imperfect competition for which, despite Chamberlain and Joan Robinson, we still do not have today any serious theories of general equilibrium.... Unless therefore we have a new powerful theoretical system, we cannot really hope to make sense in the traditional framework of analysis" (1970, p. 23); Hoffmeister (1970), in somewhat similar terms, reviewed his empirical "paradoxical" results by observing that they could "as yet offer little to compare with Samuelson's magnificent (if misleading) factor-price equalisation theorem".

Other queries related more directly to the success of "traditional trade theory" in quantifying the gains from trade. Much to the surprise of many policy-makers, trade analysts came up with rather low estimates of gains from free trade following liberalisation and the creation of free trade markets. Some of the most important and obvious gains from opening up to trade - e.g. related to scale economies and product variety - were excluded from the pure trade model. As the query from Bhagwati cited above hinted, it was only a question of time before a "new" line of analysis appeared. This second approach, developed over the last ten years, started from a fundamentally different assumption: that most economic activities are characterised by increasing rather than decreasing returns. In other words, gains from trade are those which result from the scale economies that each national economy, whether large or small, can achieve through free trade. These gains are actually far more significant than traditional trade theory would lead one to believe. Many empirical studies within the "new" trade theory tradition have pointed to the significance of such gains, both in the further harmonisation of the European Community's large internal market and in the Canada-US free trade agreement (Smith and Venables, 1988; Harris, 1984).

In terms of the opening parable, it could be said that the way to paradise for large nations, where particular activities have been concentrated in particular locations (Kruger's favourite example is mushroom production in Pennsylvania), is the same as it is for the world as a whole: bring resources together, be it motor car manufacturing in Japan or ceramic tiles in Italy. The advantages accruing to the region or country from the "agglomeration" of a particular activity diminish in importance when compared to the advantages that efficient exploitation of world economies of scale offers to every world consumer.

However, in setting out from such a radically different assumption, "new" trade theory has also led to a plethora of "new", sometimes opposing theoretical results with respect to some of the basic trade theorems. The most controversial normative result from a traditional trade perspective has undoubtedly been the illustration by Brander and Spencer (1983, 1985) that free trade may no longer be the only policy to maximise world welfare gains, but that a "strategic" trade policy may in some cases be justified and actually needed. As Dixit (1986) pointed out in his contribution to Krugman's book on strategic trade policy:

Recent research contains support for almost all the vocal and popular views on trade policy that only a few years ago struggled against the economists' conventional wisdom of free trade. Now the mercantilist arguments for restricting imports and promoting exports are being justified on grounds of "profit sharing". The fears that other governments could capture permanent advantage in industry after industry by giving each a small initial impetus down the learning curve now emerge as results of impeccable formal models. The claim that one's own government should be aggressive in the pursuit of such policies because other governments do the same is no longer dismissed as a non sequitur.

The discussion surrounding strategic trade policy has undoubtedly accentuated many features which - at least at first sight - appear to reflect more closely the industrial reality with which both policy-makers and businessmen are confronted in many sectors. Particularly with respect to analyses of technical change and international trade, this discussion seems to offer a better theoretical framework for debating the whole spectrum of trade, industrial and technology policies. The importance of monopoly rents, profit-sharing and strategic trade manipulation indeed seem of particular relevance to many high-technology industries. Furthermore, these new theories actually emerged on the US academic scene at a time of increasing fears in that country of the Japanese challenge in trade and technology (Mowery and Rosenberg, 1989).

However, the emergence of strategic trade concepts also points up some of the dynamic features associated with technological change, in particular its cumulative nature. In Dosi, Pavitt and Soete (1990), these features were identified with a different, third stream of analysis.

Compared with the previous set of "new" trade theories, this analysis more strongly emphasizes the dynamics of increasing returns, particularly those associated with production technology and innovation. Again returning to the opening parable, to the extent that technological development and growth are irreversible processes, there is no possible return to paradise. As many locational theories underline, the main reasons have to do with the way industrialization locations got "selected" early on and, by appropriating the available agglomeration economies, exercise some degree of "competitive exclusion" - to use Arthur's (1989, 1991) term - on other locations. From a dynamic technology perspective, in other words, it does matter whether a region or country is specialised in mushroom production or silicon chips. Few authors adhering to the "new" trade theory have yet fully integrated these dynamic features in their trade models and policy conclusions!

Is there no "normative" world paradise to be attained according to this last view? In terms of unifying overall principle, the answer to that question can indeed only be no. The normative counterpart of any dynamic, more evolutionary analysis emphasizes the crucial role of history, of man-made interventions, of institutions, of particular international investment decisions of multinational corporations - in
other words, of the whole spectrum of individual and collective decisions made in a system as complex as the international economic environment.

This paper discusses, albeit briefly, some of the international implications of such strategic industrial policies. There is, as will be argued below, a significant role for policy-making, both in terms of the need for a more harmonized and more coherent set of national industrial, technology, competition and trade policies, and in terms of the need for international rule-based systems to go beyond trade and include industrial and technology policy.

From this perspective, there is a significant paradox in the actual emergence and growth of such domestic strategic industrial policies and their theoretical foundations, at a time when the “domestic” at which such policies are aimed are becoming increasingly global and “multi-domestic”; are themselves involved in so-called “strategic” alliances; and are increasingly sourcing on an international scale “strategic” science and technology inputs. It is as if such firms have become cause, victims and beneficiaries of the increased trade friction that followed widespread implementation of strategic trade policy. Before discussing these issues in more detail, it may be useful — as the repetitive, yet rather differentiated use of the word “strategic” in the above sentences illustrates — to discuss some of the various conceptual definitions used with respect to “strategic” industries.

2. Strategic industries

From an analytical point of view, it seems appropriate to consider within this context three rather different definitions of “strategic”: a technological one, a trade one and an industrial one.

The first, probably most minimalistic definition relates to the military interpretation of the term “strategic”, whereby long-term access is the main reason for justifying strategic interest and readiness for extra support costs. Access to some products or technologies is thus a “strategic advantage”. The military notion of strategic is probably most clearly reflected in the attempt over the last decade to prevent the export of “strategic” high-tech products to Eastern European countries. The purpose here was clearly twofold, a military one — which need not be discussed here — and an economic “strategic” one, closely related to the essential role of certain high-tech products as inputs in both capital and final consumer goods.

However, it is not immediately obvious why high-tech products would fall under the category of strategic products, certainly not when compared to some scarce natural resource (e.g. oil), of which world supply is concentrated in one or a number of particular countries. To the extent that high-tech products are continuously subject to “creative destruction” through the entry onto the market of new inventions and innovations, and that knowledge is difficult to contain within firms let alone countries, new scientific and technological breakthroughs and the international diffusion of technology are likely to be major factors in rendering such strategic high-tech products quickly obsolete. If one thinks of the costs in developing strategic capabilities in e.g. micro-electronics technology, it will become obvious that the continuous improvements in performance achieved by the technologically leading firms might quickly render the costs of strategic support policies in this area prohibitive and, in the final instance, highly unlikely to succeed. Even the most successful strategic cases of technological “leap-frogging” all seem to reflect more good fortune than a careful strategic consideration of costs and benefits. For example, Korea, which succeeded in developing a technological capability in the production of VLSI chips over a very short period, had the good fortune to come onto the market at a moment when Japanese firms were forced to raise chip prices following American anti-dumping suits and import tariff measures.

However, as this case well illustrates, the argument for using the term “strategic” to describe high-tech products is based on the cumulative, learning and dynamic increasing returns of technological advance in this area. For many technologies, the most typical example being micro-electronics, access to technological capability — or better, the existence of a national (whether of domestic or foreign origin) technological capability — may be essential for future technological success and for the successful transfer of technology and its effective use in other sectors of the economy. The high-tech products which fall under this first heading are in other words “strategic” in that they have a disproportionate importance in terms of their pervasiveness — e.g. they are essential “raw material” or intermediate technological input in many capital and final consumer products — and in that there are strong cumulative and increasing returns involved in their development. National and supra-national technology policies have focused sharply on such products, e.g. the VLSI, Sematech and JESSI support programmes in Japan, the United States and Europe. At the same time, the term “strategic” has often been used to justify support policies in particular high-tech areas which did not really satisfy the “pervasiveness” criteria. Nuclear energy, the European aerospace programmes (Concorde) and France’s GIV are examples; whether HDTV fulfils the pervasiveness criterion remains to be seen.

The second notion of “strategic” increasingly used in the policy arena is the one most closely related to new trade theory, and is very much identified with Brander and Spencer’s 1983 article. The argument here is a straightforward economic one based on the notion of increasing returns. These are, however, more directly associated with the actual production of many items which are being traded internationally. The resulting concentration of production of particular items in some regions/countries and not in others raises the possibility of strategic intervention, i.e. the initial stimulus to get the static and dynamic increasing returns under way within the region/country before others do the same. The problem here is of course that if everybody were to develop such strategic policies, no one would any longer reap the benefits of the scale and agglomeration economies which in theory justified such policies. From a dynamic point of view, however, the picture becomes more complicated. The regional or national externalities linked to the strategic product or sector could have a significant impact on growth, apparently justifying in a more systematic way policy support for such strategic sectors.

Trade and industrial support policies for certain sectors which differ greatly from country to country — indeed, inter alia, European support policies for the aerospace industry and the French TGV initiative — could be said to fall under this category. The product or sectoral focus of industrial policy is here clearly dictated
by notions of the region's or country's actual or potential comparative advantage. The main practical implementation problem relates to the delineation of such sectors. Probably no one would continue to include the iron and steel sector under the heading of strategic, though certainly both in theory and in practice the static and dynamic economies of scale have been and still are significant in this sector.

The third and probably broadest notion of strategic underpins directly the raison d'être of industrial policy. It can best be described with reference to the French notion of "filières". Some sectors have from a national perspective such essential forward and backward linkages, both in terms of material and knowledge inputs and outputs, that they have become strategic to the country. The French automobile industry is probably the best illustration. It is estimated that one French person in ten is linked to the production of French motor cars. In this very broad interpretation a sector can be said to have become strategic because of its widespread infiltration of the whole economy through the large amount of vertical linkages. It is obvious that this interpretation of the term can easily become a very defensive one. Here too, a military analogy can be drawn: a "strategic" withdrawal is one behind lines which can then be better defended or from where a new attack can be launched. In case of substantial import penetration, for example, the domestic sector might need to be protected temporarily for national strategic reasons. The additional costs in doing so are again justified in dynamic terms: if lost, the costs in developing such a widespread new filière or re-entering the sector could well be substantially higher.

All three interpretations of the notion of strategic bring into the picture the trade-off between policies directed towards static allocative efficiency and dynamic growth efficiency. Once concepts such as increasing returns are introduced, there indeed appears to be nothing in the mechanism leading to static allocative efficiency that would also guarantee fulfillment of the criteria of dynamic efficiency. In the static neo-classical "pure" trade world, the theorem of comparative advantage will operate in its purest form: each trading partner gains from trade since they get more commodities from abroad than they would otherwise be able to manufacture domestically without forgoing any production and consumption of the commodities in which they specialise. The same could be said with respect to the static interpretation of the early new trade contributions: as in the traditional case, trade gains - in the true sense of static allocative efficiency - are typically of a "once-and-for-all" nature.

By contrast, once some of the dynamic economies of scale associated with "strategic" products and industries are introduced, one is confronted with the possibility of significant trade-offs between statics and dynamics. This point was highlighted by many authors long before "new" trade and growth theory brought it in a coherent and formalized way to the attention of policy-makers. Indeed, if different commodities or sectors present significant differences in their dynamic strategic potential - e.g. in terms of economies of scale, technical progress, learning-by-doing, etc. - international specialisations which are efficient in terms of static comparative advantage criteria may in the long run generate either virtuous or vicious circles of technological advance/backwardness.

What the debate about strategic trade policy has driven home, in contrast to the previous literature, is that the existence of such possible trade-offs is more than a special case related to infant industries: once account is taken of the continuous nature of technological change, with its various dynamic increasing returns and cumulative features, they are more likely to be the general condition of any economic system. In so far as the actual process of production in firms, regions or countries is closely associated with the existence of technological capabilities, mechanisms leading to specialisation in production also have a clear and significant dynamic counterpart - they also lead to specialisation in technological skills and capabilities.

In principle, then, there are strong arguments in favour of "strategic" technology policy (the first case), trade policy (the second case) or industrial policy (the third case). The report now examines some of the limits of such policies, focusing less on government implementation than on actual international effectiveness.

3. Domestic strategic policies for "multi-domestic" firms

While these new theoretical insights point to the importance of the welfare gains associated with free trade and the possible justification for strategic domestic industrial and technological government support action, the fact is that domestic firms with the main industrial or technological characteristics justifying government support action have become increasingly rare.

The emergence and growth of the multinational corporation (MNC) is of course not a new or recent feature. The actual internationalisation of production has been just one feature of the more general "internationalisation" of trade and flows of capital and technology that has been characteristic of the stable, liberal postwar trading system. While many such international investments might have been initially inspired by protectionist fears and a profound desire to secure access to large markets, the postwar growth in the internationalisation of production has been by and large of a complementary nature rather than a substitute for international trade flows. One could even go a step further: it is primarily the internationalisation of production over the last three decades - and not the actual international trade flows, as traditional trade theory would have it - that has led to catching-up and rapid technological diffusion of best-practice production techniques and products from the United States to a large number of OECD Member countries, and thus to the convergence of income levels.

One of the main reasons for this is that despite initial impressive foreign investment - particularly of US and European MNCs - was never limited to just production, but always included large parts of maintenance, engineering and development activities. This is, of course, not surprising, important differences may exist between domestic and foreign user requirements; foreign regulation, standards and other procurement specifications will in all likelihood be rather different from those of the firm's home country; and there may be dissimilar tastes and other economically induced differences. These factors have undoubtedly led many multinational firms to set up or take over at a very early stage research and development laboratories in foreign countries not always directly linked to their production subsidiaries. There were many instances of just this after the Second World War and a few even before; examples include North American Philips in the United States, IBM's research lab in Switzerland and the takeovers of Pathé in France by Kodak and of the Belgian Gevaert by Agfa.
With the increased international location of production activities over the last two decades, R&D activities, particularly of US and European firms, have also been increasingly internationally located. This process has probably been most pronounced in the case of multinational firms with small OECD countries as their home base (e.g. Philips in the Netherlands). There is indeed no reason why only the home base should be relied upon to provide well qualified scientists and engineers. As Pavitt and Patel (1990) illustrate in Table 1, the Netherlands — and to a lesser extent Switzerland, Belgium and Canada — are typical examples of this international location of R&D processes.

Quite naturally, national technology support policies in small countries, whether strategic or not, have for a long time been faced with a growing discrepancy between the effectiveness of such national support and its foreign impact. The difference between technology support policies in various small countries is rather revealing in this context, because it brings to light the different national policy responses to basic questions: why should a small country have a (strategic) technology support policy, and how can the “good citizenship” of foreign firms be assessed?

In more recent times, however, such trends can no longer be said to be confined to small countries, or to the couple of foreign R&D labs set up or acquired by US and European MNCs over the postwar period. A new, more fundamental globalisation trend — involving a much wider set of international exchanges, including strategic alliances and networks of scientific and technological information — has emerged and grown rapidly, particularly between firms from the so-called Triad: the United States, Japan, and the EC. Furthermore, this globalisation trend is not contradicted by the Porter (1990) or Pavitt and Patel (1988) evidence about the strongly national home base of the competitive advantages of such emerging global firms. In line with the arguments set out in the introduction, it is indeed in the first instance the national virtues which create the opportunity to cross borders. However, exactly as in the case of strategic trade theory, this emphasis, while pointing up some of the essential vertices about the nature of international competitiveness and postwar trade flows, also underscores the new, emerging trend of globalisation and networking between such firms, which are becoming more and more global in their marketing, distribution and technology sourcing, as reflected in (for example) the number of strategic alliances.

The growth of strategic alliances and networks between such increasingly global firms raises three fundamental issues with respect to the strategic policy discussion, all of which call for international policy action.

**Strategic Alliances: Towards Further Cartelisation of World Production?**

First, there is the fundamental question as to the nature of such alliances. Are they indeed a new, more or less permanent feature of the new global network economy, a reflection of the need for international sourcing and access to complex science and technology; or are they, rather, a temporary feature, the first step in the emergence at the world level of oligopolistic cartels in sectors dominated by static and dynamic economies of scale?

Obviously, the answer to this question is not just one or the other possibility. The literature on strategic alliances, as Table 2 illustrates, points to a wide variety of more or less technology-inspired motives for strategic inter-firm technology cooperation. These range from risk-sharing to seeking access to foreign markets. However, detailed research done by Hagedoom and Schakenraad points to a number of motives linked to the structure of emerging industries:

For mature industries we found some evidence that strategic technology alliances are less associated with technology involved motives and much more related to market access and attempts to restructure existing industry organization...For high tech industries and new fields of technology, technological complementarity appears to be the major motive for strategic alliances. Although a group of small companies play a distinct role in strategic alliances, these partnerships are in the first instance a matter of large companies. Large companies and in particular the group of largest companies follow the most cooperative strategy, in particular in industries which are characterised by oligopolistic structures. (Hagedoom and Schakenraad, 1990c)

The present-day trend towards globalisation, alliances and networking, to the extent that it involves a far greater share of world production (including production of component suppliers), investment (including intangible investment), access to markets and other firms’ tacit knowledge (including mergers), cannot be viewed independently from the increasing trend towards world oligopoly in many sectors dominated by economies of scale.

The first major policy issue is, consequently, whether a global competition policy is needed and how it should be implemented. The existence of a supranational form of competition policy aimed at counteracting the emergence of worldwide cartels between global firms would directly undermine one of the reasons for strategic government support, namely dependence on “foreign” monopoly pricing.

**Privately sponsored or government strategically sponsored alliances**

The second major policy issue is whether such strategic alliances and technology networks are truly based on firms’ actual needs for international exchanges, improving resource allocation, more dynamic innovation and faster spread of best practice techniques, or whether they are in the first instance motivated by the desire of large global firms to take advantage of various domestic strategic support policies. From this perspective, the attempt of global firms to become “multi-domestic” and present themselves as “good domestic citizens” in as many countries as possible is also the result of the growing importance of national strategic support schemes, which could provide major competitive advantages to domestic “national” competitors (Mowery and Rosenberg, 1989).

Again, an adequate response to these questions must take into account both possibilities. Many of the largest firms increasingly seek global strategies that strike a balance between reaping some of the scale advantages of global markets and exploiting the often geographically determined diversity of consumers and production factors. The large multinational firm’s organisational and production technology often gives it the necessary flexibility to confront this diversity. The
decentralisation of its production units, marketing and even research, together with a diversification of subcontractors, will enable it to take full advantage of global access, including government-sponsored access to scientific and technological knowledge. At the same time, the precise location of such a firm's plant will depend heavily on the local surrounding environment. Whereas the choice will often depend on the availability of local skills, infrastructure access to knowledge and local government support, the firm itself will of course contribute not just to local output and employment but also to the long-term development and growth of the region, in terms of skills, training, access to knowledge, local suppliers' knowledge and networks. These often scarce factors constitute precisely the "externalities", i.e., the increasing return growth features of long-term development. That explains why regional/local authorities have always been keen on providing incentives for foreign firms to invest and locate in their particular region.

Here too, the multi-domestic firm questions the relevance of national policymaking. In contrast to the previous case, however, it does so from a regional/local perspective. As mentioned above, multi-domestic firms will both take advantage of and contribute to the emergence of locational infrastructural advantages. It is this infrastructure that "develops", so to speak, the long-term externalities and human resources; the interaction with public research institutes and universities; input-output relations with local suppliers, users, etc.; and the basis of a regional growth pole.

Multi-domestic firms' effective exploitation of as well as contribution to such locally as opposed to nationally created advantages raises a number of interesting policy paradoxes. At the national or supra-national (EC) level, there will be major concern, particularly at the technological end, about national strategic support policies flowing to such "foreign" firms. Attempts will be made to exclude them from nationally (including here also the EC) sponsored strategic policies. However, at the local site level, there will be increasing rivalry concerning the services offered to firms, with little interest in the domestic or foreign origin of such firms; to the region, most of the firms will be foreign. Such rivalry will itself often result in a multiplicity of new growth sites, science parks or "technopoli" — none developing the necessary size to reach some of the essential scale externalities and dynamic growth features, and all increasing the cost of communicating and interacting.

The growth in strategic alliances has also been strongly influenced by the actual policies set in motion, particularly in the EC. Table 3 illustrates the pattern of privately and EC-sponsored technology alliances within the framework of the PUREKA and ESPRIT programmes. The EC-sponsored alliances are an order of magnitude larger than the privately initiated co-operative alliances, and can from an EC perspective — with the creation and collaboration over European borders of a European IT industry — be considered a success. However, two crucial policy questions come immediately to mind.

First and foremost, to what extent have these initiatives led to further cartelisation of the European IT industry, with monopoly pricing as the main cost to the European consumer (see the previous discussion above), and secondly, to what extent have the benefits of such strategic support R&D programmes flowed to other "foreign" global firms, through strategic alliances between European and US and Japanese firms?

Clearly, while multi-domestic firms have sometimes succeeded in reaping the benefits of such (supra-)national policies, the national or supra-national (in the case of the EC) effectiveness of such policies is very much an open question.

"Strategic" networks of technology: who gets access and who is excluded?

The third policy issue relates to access to technology for those firms/countries not belonging to the networks.

As indicated above, one has witnessed over the 1980s in particular a rapid growth in strategic technology alliances between companies on an international scale. While there had been a gradual increase in the number of manufacturing joint ventures in the period from 1950 to 1975, R&D operations were of little importance to such ventures. Since the mid-1970s, there has been a dramatic growth in joint ventures involving R&D activities. Figure 1(a-f) presents a visual impression of the growth in international alliances based on the detailed data bank developed by Hagedoorn and Schakenraad (1990a) of new co-operative agreements in three core technologies: information technology, biotechnology, and new materials.

In addition to the substantial growth in the number of new co-operative agreements over the 1980s, the data in Figure 1 illustrate the importance of firms from the Triad. The dominance of these "Triadic" companies is reflected in the fact that they account for over 90 per cent of all the agreements reported in Figure 1.

There are some minor differences between the three core technologies. In information technologies, the share of agreements with or among non-Triad country companies has risen to over 8 per cent, and in new materials the share of non-Triad co-operation reaches a level of almost 10 per cent. A large section of these non-Triad agreements covers collaborative projects between companies from Triad countries and companies from South East Asian NIEs. In biotechnology, about 95 per cent of the agreements are still concentrated in the Triad. In all three fields of technology, intra-US co-operation takes the largest share of all agreements — particularly in biotechnology, where over 35 per cent of the agreements refer to intra-US collaboration. That collaboration is followed by Western Europe-US partnerships, intra-Western European agreements and co-operation between companies from Japan and the United States.

As the data in Figure 1 already suggest, such a geographically concentrated network of strategic alliances raises major issues about access for those countries/companies not belonging to the already existing networks. In the absence of an international regulatory framework, it is likely that such technology networking will increase inequality of access to technology and investment. In other words, there is a need for broad international principles such as reciprocity in access to technology networks, including the particular preoccupations of the NIEs and developing countries.

In terms of this discussion on strategic policy, the data in Figure 1 undermine probably most strongly the effectiveness of national strategic technology policies. Such national support policies will increasingly lead to benefits flowing away to other countries and foreign firms. Eliminating the latter from these policies or
limiting the technology flows to foreign countries will be difficult to achieve and will generally be counter-productive, as the ICL case in the JESSI programme illustrates.

4. Strategic trade policy: the systemic risks

Having addressed the increasing lack of effectiveness of domestic strategic industrial policies, the report now turns to some of the international implications of such policies. The assumption here runs contrary to the arguments set out in the previous section: such domestic policies are not only justified on theoretical grounds, but they are effective with respect to domestic industry. What, in other words, are the international implications of strategic policy rivalry among individual nations/trade blocs?

It is important to distinguish some of the motives underlying the wide variety of strategic industrial policies. It may be useful to begin with those that originate in either domestic distortion or infant industry arguments — policies that were implemented in many OECD Member countries long before they could be upgraded to the title of “strategic” policies.

In their international interpretation, such policies belong to the broad category of domestic distortions. The domestic distortions approach (Caves, 1987) also points to the fact that trade interventions are a particularly inefficient way of dealing with the problem. In the interpretation of “strategic” industrial policy, for example, the often-encountered subsidy support arguments, by downgrading the role of trade policy, not only highlight the fact that the compensation must occur as closely as possible to the origin of the distortion; they also underline the real and hidden costs of the direct income transfer in favour of the strategic industry.

As a result, policy support for such direct income transfer will be less than in the case of an import restriction, where the hidden taxation is indirect and less obvious and can even be presented as being borne by foreign competitors.

Furthermore, and as highlighted in the domestic distortions literature, domestic strategic policy actions to correct one’s own domestic distortions have a significant international risk. “If one country used a bona fide domestic policy to correct a price distortion, such as forcing domestic producers to sell at short-run marginal cost (at home and abroad) when there is significant excess capacity, competing producers in other countries could invoke national anti-dumping laws because selling below full cost is defined as dumping in practically all jurisdictions, as well as in the GATT Anti-dumping Code”. Similarly, “if one country subsidized the use of an overpriced input or assisted an exporting infant industry...producers in other countries could invoke national countervailing duty laws. Indeed, countervailing duty laws could apply even if a country used a pure income transfer to aid producers (workers) in distress because the subsidy would enable them to remain in their line of business” (Stiegemann, 1989).

The systemic trade risks of strategic industrial policy are from this perspective related to retaliatory political pressure, and in particular to the easy access to “legal” anti-dumping and countervailing duty measures which domestic producers are practically automatically entitled to once subsidising or selling below full costs can be proved.

The more defensive domestic distortion arguments can be expanded to include “foreign-caused” distortions. The strategic intervention is now motivated by the allegedly “foreign” unruly behaviour, itself often the result of foreign industrial policy which was not called strategic when implemented, but which after the fact clearly appeared to be “strategically” inspired in terms of the resulting successful foreign catching-up or increased world market share. This motivation is usually strongest in countries/sectors which have seen their world or domestic market position come under foreign pressure.

In this case, because of the transparency of subsidy claims for support for particular strategic industries, governments will have an even stronger preference to go for the more hidden import restriction apparently borne by the foreign competitors. As Stiegemann put it: “The deficit of political support for an open domestic income transfer as compared to import restrictions is even larger if the motive for intervening with free trade could have been fudged by accusing foreigners of selling at ‘unfairly low prices’”. This political pressure has been typical, for example in the case of the US-Japan 1986 semiconductor trade agreement (see Baldwin and Krugman, 1987a) — where, rather than granting the US semiconductor industry R&D and production subsidies, US policy focused on attacking Japanese predatory pricing with the aim of freeing trade, particularly in Japan. The result, a near-doubling of the price of Japanese 256K chips, has hurt world consumers greatly and transformed Japanese industry into a “rent-collecting chip making cartel!” (The Economist, 22 September 1990) which invests its rents in the development of future generations of chips while dumping the newest generations onto the domestic market to the benefit of all user industries and Japanese consumers.

Strategic industrial policies thus contain a number of protectionist pressures, mainly because of the temptation to go for bilateral retaliatory trade action which — in typical protectionist fashion — leads to further domino protectionist effects. Clearly, strategic industrial policy calls for yellow and red cards on the international playing field; leaving things to the trade negotiators of the two teams might quickly result, as The Economist put it, in the same number of goals scored at each end.

At the strategic technology end, to link up to some of the arguments set out in Section 3, it is clear that domestic strategic technology policies, while aimed at solving some of the domestic distortions implicit in the possible static/dynamic trade-off, also could have important international implications — not least because of the origin of the technology support, i.e. private funds or government. The discussion surrounding the Boeing-Airbus case is also illustrative in this regard. Indeed the case is not limited to the issue of whether the Airbus subsidies made world consumers better off by lowering Boeing’s prices (Baldwin and Krugman, 1987b), or whether Airbus was justified in claiming European subsidy support to overcome entry barriers in the building of wide-bodied aircraft. R&D support for Airbus might have been justified in terms of the indirect past military R&D support for Boeing. It also includes the international implications which such domestic government support for R&D might have on the long-term survival of competitors who invest in R&D without government support. From this perspective the Boeing-
Airbus case is again illustrative. The long-term result might be that both firms can only survive if both now benefit — on a more or less permanent basis — from government industrial and R&D support. In other words, the particular "strategic" technology policy has led to a domino effect whereby strategic technology support policies have become essential to the survival of firms in all the competing countries.

The distorting effects of such differences in R&D funding and the possible existence of "learning" barriers are at present of course weakened by the extent to which firms are increasingly entering strategic alliances to overcome such barriers, as we saw in the previous section.

Even apart from this, it is obvious that the spreading of domestic strategic technology policies will rarely be efficient from a global perspective. The multiplicity of nationally sponsored research initiatives will in all likelihood lead to duplication. Avenues which might be more promising, even essential from a world social rate of return perspective, will receive less priority. It is for this reason that the policy synthesis report currently under preparation in the framework of the OECD's Technology Economy Programme calls for co-ordination of national policies, and even international burden-sharing once global issues such as the environment, health, food and population are included.

5. Conclusions

"New" trade theory and, in its footsteps, "new" growth theory have brought back into economic analysis a great deal of economic realism: with respect to the way firms operate in industries dominated by economies of scale and imperfect competition; the way consumers consume differentiated commodities and look continuously for variety; and the way countries grow and trade with one another, not on the basis of decreasing returns or "given" factor endowments, but on the basis of often historically grown "externalities", based on absolute cost and technology-created advantages. In doing so, trade theory has brought back into the spotlight the importance of the gains from free trade to world consumers, yet at the same time it has opened up a Pandora's box of possibilities for governments to intervene in order to set in motion the virtuous circle of growth, international competitiveness and technology accumulation.

To some extent, these "new" insights highlight the point made by many businessmen and national policy-makers long ago: that static international specialisations, which are clearly efficient in terms of static comparative advantage criteria, may not be so in the long run because of sectoral differences in dynamic growth potential. However, what this rather old debate dressed up in its new strategic policy clothes has underlined is that arguments about the existence of national policy trade-offs also have an international price. That price is probably least in terms of the actual subsidies spent on the strategic sector and their possible trade-distorting effect. The distortion is possibly highest when subsidies lead to the sort of retaliatory trade and pricing action typified by the 1986 semiconductor agreement between the US and Japan, with its high cost to world consumers and the systemic risk of increased protectionism it poses.

In this paper, the emphasis has been on another international feature of strategic policy: the domestic firms for which such strategic domestic policies could be developed on the basis of "newly" found theoretical wisdom have grown increasingly global, and are involved in strategic alliances with foreign firms — themselves possibly the result of strategic foreign policies. This increasing globalisation trend raises a number of important policy issues, not least with respect to the level at which policy should be implemented. It is obvious that global, network or multi-domestic firms increasingly question the meaning of such national policies. In many cases the "good citizenship" of these firms may equal that of national firms. In other cases, it may not. It is difficult if not impossible for governments to draw lines here: the result will generally be total inclusion or total exclusion of "foreign"-owned firms in national policies.

There is now an urgent need for international policy-making in a number of different areas related to technology issues. This discussion has stressed in particular the need for international competition policy. While such policy should aim at countering the emergence of worldwide cartels between global firms and reducing the divergence between national competition policies, it would also reduce much of the raison d'être for strategic policy.
Table 1. Foreign-controlled domestic technology compared to nationally controlled foreign technology (based on US patenting 1981-1986)

<table>
<thead>
<tr>
<th>Home country</th>
<th>US patenting from inside country by foreign firms (as % of country’s total US patenting)</th>
<th>US patenting by national firms from outside home country (as % of country’s total US patenting)</th>
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<tr>
<td>Belgium</td>
<td>45.7</td>
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<td>Germany</td>
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<td>Italy</td>
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<td>Netherlands</td>
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<td>Sweden</td>
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<tr>
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<tr>
<td>United States</td>
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Table 2. An overview of motives for (strategic) inter-firm technology co-operation found in the literature

I. Motives related to basic and applied research and general technological developments:
- Reduction, minimising and sharing of uncertainty in R&D:
- Reduction and sharing of costs of R&D:
- Increased complexity and inter-sectoral nature of new technologies, cross-fertilization of scientific disciplines and fields of technology, monitoring of evolution of technologies, technological synergies, access to scientific knowledge or to complementary technology:

II. Motives related to concrete innovation processes:
- Capturing of partner’s tacit knowledge or technology transfer, technological leap-frogging:
- Shortening of product life cycle, reducing the period between invention and market introduction:
  OECD (1986a), Mariotti and Ricotta (1986).

III. Motives related to market access and technology development:
- Monitoring of environmental changes and opportunities:
- Internationalisation, globalisation and entry to foreign markets:
- New products and markets, market entry, expansion of product ranges:
Table 5. Joint collaboration of the top 35 firms in information technologies in European technology programmes (A) and privately established links (B).

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Source: MERIT/CATI
Figure 1(a-f): GROWTH OF NEWLY ESTABLISHED TECHNOLOGY CO-OPERATION AGREEMENTS IN BIOTECHNOLOGY, INFORMATION TECHNOLOGIES AND NEW MATERIALS

Figure 1a. The structure of strategic partnering in biotechnology, 1980-1984

Legend:
- Solid lines: 4 or more alliances
- Dotted lines: 2 alliances
- Dashed lines: 1 alliance

Source: Hagedoorn and Schakenraad (1990d)

Figure 1b. The structure of strategic partnering in biotechnology, 1985-1989

Legend:
- Solid lines: 4 or more alliances
- Dotted lines: 3 alliances
- Dashed lines: 2 alliances
- Dashed-dotted lines: 1 alliance

Source: Hagedoorn and Schakenraad (1990d)
Figure 1c. The structure of strategic partnering in information technologies, 1980-1984

Legend:
- 7 or more alliances
- 5 or 6 alliances
- 3 or 4 alliances

European Firm  
Japanese Firm  
US Firm  
Other

Source: Hagedoorn and Schakenraad (1990d)

Figure 1d. The structure of strategic partnering in information technologies, 1985-1989

Legend:
- 7 or more alliances
- 5 or 6 alliances
- 3 or 4 alliances

European Firm  
Japanese Firm  
US Firm  
Other

Source: Hagedoorn and Schakenraad (1990d)
Notes

1. The few exceptions include Markusen and McDonald [(1985), and Markusen (1989, 1990)], who indicate devastating results for the traditional distribution of trade welfare gains. For more detailed analysis see Dosi, Pavitt and Soete, 1990.

2. For a detailed theoretical argument along these lines very complementary to Porter's more descriptive analysis, see Dosi, Pavitt and Soete, 1990.

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Beyond the Border: The New International Policy Arena

by

Sylvia Ostry

Chairman, Centre for International Studies, University of Toronto

1. Introduction

The title of this paper suggests that the new arena for international policy cooperation is moving beyond the border, to domestic policies. The basic reason for this shift lies in changes in the extent and nature of the international linkages among countries which have produced a new type of friction which could be called system friction. The struggle over competitiveness in the Triad of the United States, Japan and the European Community, which has generated the policies targeted at so-called strategic industries, is a symptom of this far broader malady of system friction. These developments will be described briefly as a background to the exploration of the policy options required to mitigate or contain the new discord.

2. International linkage

There have been three phases of growing international linkage among countries since the Second World War. The first of these was driven by trade—the golden age of the 1950s and 1960s launched by the dismantling of protectionist barriers in successive GATT rounds. Over the decade of the 1970s, three massive commodity and oil shocks initiated the second phase, which was financial integration, via the recycling of the OPEC surplus. The wave of financial integration accelerated in the 1980s, fed by the Ronald Reagan revolution of deregulation and privatisation and the emergence of the Japanese current account surplus.

We are now at the outset of a third phase called globalisation, which is characterised by a surge in foreign direct investment. After the war foreign direct investment was characterised by "le défi américain" in Western Europe. The present upsurge, which began in 1983 and has steadily picked up speed, is very different in both origin and destination. By 1983 the United States had become a net recipient of FDI (i.e. large outflows were outweighed by still larger inflows). By