Country Capabilities and the Permeability of Borders

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transparent in terms of the technical information, but their implementation involves complex interdependence with existing organizational structures and operation. It is harder to transfer, or imitate knowledge, when their causal properties are poorly understood and articulated in terms of their implications for the prevailing organizing principles of a firm and their relations with other institutions. Ultimately, the analysis of the permeability of firm and national borders hinges on the institutional characteristics of the organizing principles of a country.

Based on the notions of organizing principles developing within a trajectory, we reach the following conclusions:

1. Trade and foreign direct investment patterns among developed countries reflect the sectors favored relatively by a country's organizing and technological strengths, and these patterns promote further expansion and investment in these capabilities.
2. The driving explanation for sustained absolute country advantages is to be found in the persisting variation of organizational and institutional capabilities among countries.
3. Horizontal foreign direct investment is the extension of organizing capabilities across borders.
4. Vertical foreign direct investment is the sourcing of cheaper factors of production, as well as the tapping of the resident technological and organizing principles of foreign locations.
5. Long-term cycles in country leadership are generated by the arrival of new methods of organization that are first limited to a country and then slowly diffuse internationally, but, ultimately, the leading country has gained in wealth, inclusive of foreign assets.

These points are developed below by drawing on disparate, yet overlapping literatures, with the principal sources being Lippman and Rumelt (1982), Nelson and Winter (1982), Piore and Sabel (1984), Stiglitz (1987), and Winter (1987). The first sections propose that countries are characterized by the accumulation of capabilities and that competitive differences among countries persist for long periods of time. The next section broadens this perspective to include the organizing principles that prevail in a country. The concept of neighboring technologies is examined in the fourth section in terms of the institutionalization of technology and organizing principles. The fifth section turns to explaining the slow convergence to best practice in terms of four factors: technological opportunity, selection pressures, identifiability and institutional lock-in. The final section explores why the slow diffusion of best practices and differences in learning capabilities generate competitive cycles of leading countries.

LONG-TERM TRENDS IN COUNTRY COMPETITION

Concern over the relative decline of the United States during the 1970s and 1980s has focused attention on recent history as period of inquiry. There has been unquestionably a perplexing productivity problem in the United States since the oil shocks, though its severity is not greatly different from that found in other developed countries, including Japan. And there is certainly little question that the U.S. dominance has diminished greatly since the early post-war period.

However, as the seminal study by Maddison (1982) shows, the most impressive years for the U.S. were those of the late 1800s and early 1900s. The trends point very clearly to the emergence of the U.S. in the late 1800s, with the U.K. falling steadily behind. Equally impressive is the rise of Germany and Japan at the turn of this century. The effects of wartime losses are apparent, but what is remarkable is the resumption of these trends after both world wars for Germany, and after World War II for Japan.

Because productivity has been the center of considerable controversy, it is especially interesting to note that the U.S. has never had an outstanding performance in labor productivity in any one period. While its persistent cumulative growth over a century is striking, there is little doubt that the productivity lead of the United States had been eliminated by the 1980s. This loss of leadership contrasts strongly with the dominant position held by the U.S. earlier in the century. Sectoral studies indicate, moreover, that this productivity advantage was diffused across many industries. In particular, in a study that received substantial attention in the U.K. at the time of its publication, Rostas (1948) found that the U.S. had better productivity than the U.K.

in every industry he examined; even as recently as 1972 the U.S. led Japan in 54 of 60 industries (Maddison, 1982: 102–103).

These findings are important reminders of the distinction of relative and absolute advantage. Since Ricardo, it is well established that the sectoral composition of trade among countries is determined by relative advantage. A country will specialize in those industries in which it is relatively best at doing. Investment allocations are influenced by home and foreign demand; the development of relatively unfavored industries over time is, consequently, hindered. The observation that a country has a comparative advantage in exporting a particular product is not an indication of any absolute country advantage, as prices (perhaps via exchange rate movements) eventually equilibrate trade flows among countries. But the equilibrium will reflect absolute advantage by differences in the wealth of countries. Ricardo's lesson of relative advantage is a statement about the sectoral composition of trade, not an explanation of an absolute country advantage; to the contrary, it leaves unanswered why a country may be absolutely more productive in all sectors.

TECHNOLOGICAL CAPABILITIES

These long-term trends pose a fundamental quandry for theories of international trade and investment that focus upon sectoral composition. Most explanations for export and foreign direct investment flows have tended to focus on the industry and firm level of analysis. Home market rivalry and a firm's possession of 'intangible' assets, such as brand labels or product innovations, drive the international competitiveness of a country's industries.

The most consistent empirical finding has been the correlation between R&D expenditures and the international competitiveness of industries. In a recent review of empirical work on the determinants of exports, Deardorff (1984) concludes that R&D is the primary determinant of

But this correlation of R&D expenditures with exports or foreign direct investment has an important implication that is frequently missed. R&D is as much an outcome of profits and growth, as a determinant; distilling the causal path has proven empirically difficult (Griliches, 1986). Countries develop and reinvest in those industries in which they are relatively favored. What starts out as relative advantage determining trade patterns itself over time influences the investment in new advantages. Comparative advantage and the capabilities of countries are dynamically altered by new investment.

In this regard, it is an important observation that the pattern of technological specialization among countries appears to be stable over long periods of time. Pavitt and Soete (1982) found distinct differences in the sectoral distribution of patents and export shares among countries. In extending the work on technological accumulation to country competitiveness, Pavitt (1987) found that several measures of a country's technical specialization are stable over several decades. In testing for this stability, Cantwell (1989) estimated that country shares of patents among industry sectors are significantly correlated during the post-World War II period and, to a lesser extent, during the century.

These findings are especially significant in light of recent arguments regarding the cumulativeness of technology at the firm level.[3] They pose, therefore, the question of whether technology accumulates in a country in much the same way that it appears to accumulate in firms. What is interesting in considering this question is that the answer points to the importance of the institutional context and the organizing principles of a country.

Consider first, the explanation for why technology accumulates at the firm level and generates firm-specific capabilities. The development of firm capabilities is often viewed as indicating that technological advancement occurs by incremental additions to the current stock of knowledge. In this regard a more ambitious claim is that technology is not only incremental but also

practice for solutions to problems and opportunities as they arrive and are identified. Innovations are made in response to market demand, including the demand to substitute scarce or costly factors.[4] Moreover, their viability is also determined by market acceptance. In this sense demand plays an instrumental role in the production and success of innovative activity.

Once, however, a set of technologies are selected, they are constrained to evolve within the limits of physical laws, but are also successively applied to new problems in related markets and industries. Thus, the notion of a technological trajectory is closely coupled to the concept of technological opportunities, as developed by Scherer (1965). These opportunities are driven forward by the expansion of basic sciences and by the applicability to new industries. A new trajectory is the routinized application of novel solution heuristics that expresses the current frontier knowledge.

These observations on the cumulativeness of technology embed implicitly the argument for why firms within a country develop similar technological capabilities. In part the commonality stems from the basic assumption that firms respond to market needs and that the market selects products (and potentially firms) on the basis of their competitive cost/performance qualities. The effect of facing common market stimuli and demand-driven forces of selection can alone explain why a population of firms within a given environment tend to offer similar products.[5] Across-country variation in demand characteristics, by this argument, generates a parallel variation in product types.

But this argument of market selection is not sufficient to explain why these home market patterns should extend to international trade. Nor does it address the persistence in country technological patterns. It is the cumulative process by which technological capabilities are built that explains the link between trade patterns and the home market. The cumulative capabilities of firms, developed in response to their home markets, provide the competitive basis for expansion overseas, yet at the same time, limit the feasible range of products. Foreign trade and investment, as Burenstam Linder (1961) seminally observed, are but the extension of the home market across borders.

Of course, firms whose origins occur under conditions of the internationalization of markets may develop a wider set of capabilities than those corresponding to the needs of any one national market. But this logical possibility only underscores the argument, that is, that the early entrepreneurial history of a firm tends to 'lock in' its subsequent development.[6] That most firms have originated in environments that are largely national is an empirical claim, but one that has tended to be historically true (Porter, 1990).

Trade and investment flows consist, then, of the domestic products that correspond to the international market. Yet, as noted earlier, there is a dynamic element, as the expansion overseas draws investments and new resources into these favored industries. Thus, the well-known property of international trade tending towards specialization also has the implication of fostering the specialization of a country's capabilities.

The discussion so far has stylized the problem as the accumulation of capabilities lodged within firms. This view is too restrictive, for capabilities are also developed by the wider set of institutions in a country. For example, the strength of the German universities in chemistry was noted in the late 1800s, especially as the flow of German students to British universities began to ebb (Freeman, 1982). The link between science-based centers and economic organizations is one of the institutional aspects constituting national systems of innovation and technology (Freeman, 1987).[7]

In this wider perspective, then, the investments made by public institutions are part of the process by which capabilities are routinized within a country. The characteristics of these systems differ across countries in terms of human capital formation, the level of entrepreneurial activity,

[4] That innovation is stimulated by scarcity has a long history of controversy, including in the area of international economics. See David (1975) for a general discussion, Winter (1981) for a formal treatment, and Kogut (1987) for a review of the international applications.

[5] This argument does not rule out learning among firms. Selection may operate at the product level, with firms learning from each other's success.

[6] See Arthur (1989) and Stiglitz (1987). Kogut (1987) discusses a similar idea labeled 'intertemporal dependence'.

[7] See also Malerba (1990) for a description of the Italian system of innovations and Herrigel (1992) for an analysis of the institutional resources in the German machine tool industry.

or the rigorousness of competition. But also since the technological opportunities of different sciences will vary, the long-term performance of countries can vary to the extent that these scientific resources are national and do not spill over borders.

COUNTRY CAPABILITIES AND ORGANIZING PRINCIPLES

There is, of course, no reason to limit this notion of a trajectory spreading within an economy to a narrow definition of technology. Changes in the organization of work, either at the factory, corporate, or industry level, can also follow a natural trajectory. In fact, the two examples given by Nelson and Winter (1977) of a trajectory are essentially organizational; that is, the exploitation of latent scale economies and increasing mechanization of operations that have been done by hand.

It is, of course, difficult to establish the numerical data, as can be established for R&D, indicating country specialization in organizing principles. These principles may be of a few types, such as the craft and mass production distinction made by Piore and Sabel (1984) and Coriat (1979). Or they may be more variegated in terms of structural characteristics, as suggested in several bi-national studies,[8] or of managerial ideologies (Bendix, 1956).[9] But that such differences exist can scarcely be doubted.

A more provocative claim is that organizational innovations also develop along a trajectory. Several historical accounts suggest such a dynamic in the slow diffusion of organizational practices within a country. Consider three examples of the diffusion of organizing principles from the industrial histories of the United Kingdom, the United States and Japan (their international diffusions are traced later). The advancement of the United Kingdom was due to the expansion of organized industrial production, as Adam Smith so clearly explained in his example of the division of labor in the fabrication of pins. The application of water, and later steam, to drive capital equipment within an organized factory made its early and most striking appearance in the British textile industry before diffusing widely to other industries (Deane, 1975). That the division of labor within the factory was accompanied by the introduction of new capital equipment should not obscure the significance of the organizing innovations.

The U.S. developments that led to a system of mass production are especially well documented.[10] Smith's (1977) study of interchangeability of parts in the U.S. armories showed a 30-year lag before the techniques were transferred successfully among only two armories. The development of the American System of Manufacturing took more than 100 years to evolve the concept of standardization and mass production (Hounshell, 1984). Interestingly, the system evolved from the application of standard gauges in weapons armories used in craft shops to the application of standardization in the very production process itself, as best exemplified in Ford's assembly line. Of great importance, the pattern of diffusion shows the important role played by a few key industries in diffusing these techniques within the national industrial and service network. Similarly, the principles of scientific management–as a further expression of the standardization of production—spread from the machine shops in the Philadelphia area to tire manufacturing to wholesale/retail operations (Nelson, 1980). In the 1920s and 1930s it was actively applied to the office place, as especially expressed in the creation of secretarial pools (Davies, 1982).

A more recent example is derived from Japan, as best characterized by Toyota's use, in Krafcik's (1988), terminology, of lean flexible production, though the historical roots may be much earlier (Dohse, Juergens and Melsch, 1985). The historical accounts indicate that the principles of just-in-time and pull systems (kanban) of manufacturing were innovations taking place at Toyota in the late 1950s before spreading to suppliers and eventually other firms (Cusumano, 1985; Fruen,

[8] See, for example, Dore (1973), Lincoln, Hanada and McBride (1986), and Maurice, Sellier and Silvestre (1984).

[9] The genesis of these country differences is an important topic, but peripheral to our argument. The sociological foundation to such an inquiry is best laid out in Stinchcombe's (1965) discussion of the imprinting of the social environment on the structure of organizations. For a discussion of imprinting and country variations, see Kogut (1987).

[10] See the more extensive account in Kogut and Parkinson (1992).

1989). The full documentation is far from complete, but it would not be surprising that these techniques have applications to non-manufacturing sectors as well.

The above historical account has a clear implication, that is, that major innovations of organizing principles occurred in different countries at different moments in history. Certainly, parallel developments have taken place in many countries, as, for example, with the simultaneous application of engineering concepts to the organization of factory work in western Europe and the U.S. (Maier, 1970). Yet it was in the U.S. that scientific management first was widely disseminated, as clearly recognized by Europeans at that time (Devinat, 1927).

Of course, a country can compete on world markets with inferior organizing capabilities, but cheaper factor costs, as the doctrine of relative advantage has long demonstrated. But to return to the puzzle posed by the long-term trends given by Maddison, the dominance of a country's world position requires an explanation consistent with absolute advantage. Certainly, the solution may lie in high rates of capital accumulation, natural resources, or labor abundance, but the econometric evidence suggests that this answer leaves much to be explained (Nelson, 1981).

The explanation outlined above is that the leadership of a country is not driven alone by technological investments, but also by the efficiency of the dominant organizing principles.[11] There is little evidence, for example, that the U.S. economy was performing better in the production of technologies (as measured by patents) than the German or the U.K. (Cantwell, 1989). In the view of Boyer (1984), the slowdown of European productivity growth and the superior performance of the American economy just prior to World War I were attributable to the adoption of new methods of management in the U.S., breaking the bottleneck in the organization of factory work that was plaguing both continents.

A cursory analysis of world competition in automobiles—one of the most important manufacturing industries in international trade and investment in this century—is telling. The failure of U.S. bicycle manufacturers to consolidate factories into mass production and maintain their export dominance is in counterpoint to auto companies, even though the development of automobiles and the breakthrough technologies were pioneered in Europe and, especially, France (Laux, 1976). Ford, in particular, led the way, with the leading European market share supplied by a single plant in the U.K. by World War I. The response of the French was a constant effort to adopt American methods (Fridenson, 1987), an effort which largely failed in the U.K. (Lewchuck, 1987). Similarly, Ford and General Motors, both of which exported knock-down vehicles from the U.S., had far away dominant market share in Japan through the 1930s (Mason, 1990).

On reflection, it is hardly accidental that no European producer relying on American-derived techniques of mass production has achieved significant penetration in the U.S., with a brief exception of Volkswagen before German wages climbed to parity. The success of the European auto companies in the U.S. has largely been achieved through the export of higher-end vehicles, manufactured on the basis of craft modes of production, as described by Piore and Sabel (1984). Nor did Japanese auto companies achieve dramatic success in the U.S. in the 1950s and 1960s, despite considerable efforts to do so and much lower domestic wages. Japanese penetration in American markets occurred only subsequent to the further evolution and application of the principles of 'Toyotism' (Cusumano, 1985; Dohse *et al.*, 1985).

The auto history highlights an important point. Foreign direct investment is the extension of the organizing principles of domestic firms into foreign markets. As has been often noted, multinational corporations carry their home country practices overseas.[12] This point was not lost on the European observers such as Servan-Schreiber (1969), who noted that the U.S. success in Europe was largely based on 'the new methods of organization' embodied in its domestic multinational corporations. With the penetration of Japanese trade and multinational investments

[11] Chandler (1990) is clearly in agreement in the primacy of organizational capability for international competitiveness, but he differs in citing scale and scope as universally instrumental rather than treating organizing principles as differing 'modally' among countries, as best identified with the work of Piore and Sabel (1984).

[12] See, for example, Dunning (1958, 1986) and McInnes (1971).

in the U.S. and Europe, observations and empirical evidence on the importance of the related organizing practices were prevalent (Dunning, 1986; Ouchi, 1981). Parenthetically, it is important to note that this unidirectional extension of country capabilities via exports and foreign direct investment becomes attenuated over time by the activities of multinational corporations. Dominant theories of foreign direct investment emphasize the 'push' of home industry and firm factors on the horizontal expansion of a firm across borders. The above argument proposes that country capabilities can also 'pull' the location of foreign subsidiaries for the sourcing of resident advantages in technologies and organizing practices. By implication, the puzzle of the tendency of foreign direct investment in manufacturing to flow towards high labor countries can be resolved as the product of the pulling of investment to the locational centers of the leading technologies and best practices.[13] But, as consistent with our earlier argument, we would expect that the sourcing—and especially transfer—of best practice is more fraught with difficulty than the acquisition of technologies.

In summary, the argument that countries differ in their organizational, as well as technological, capabilities, and that these capabilities tend to develop and diffuse within a trajectory, provides a perspective for understanding long-term trends in international competitiveness. International trade and investment are driven by the incorporation of frontier technologies in capital goods and products, and by the international diffusion of best practice in the organizing principles of multinational corporations.

INSTITUTIONAL BASIS OF COUNTRY CAPABILITIES

It would be misleading, however, to suggest that the cumulative nature of technologies and organizing practices prevents imitation. To the contrary, the evidence points to a surprisingly rapid imitation of incremental product and process technologies.[14] While these studies concerned product and process innovations, imitation lags appear to be longer for organizational innovations, as indicated by several empirical studies (Armour and Teece, 1978; Daft, 1978; Damanpour and Evan, 1984).

Whereas there is ample empirical evidence that imitation times and costs vary by technology, industry, and even country, there is no consensus on the explanation. Certainly, the number of competitors and their resources are a portion of the explanation, but this industry feature then begs the question why the number of imitators varies across industries. In part, the answer is to be found in what can be called the 'conditions of appropriability', that is, the legal and institutional factors which determine the profitability to the innovation which can be recovered by the innovator. As these conditions vary by country (e.g. patent policy or industry structure), the potential for appropriability also varies across nations (Kogut, 1987; Teece, 1987).

Another explanation appeals to history dependence and lock-in to current practice, as described earlier. Atkinson and Stiglitz (1969) observed that learning externalities are 'localized', that is, that improvements in a technique only benefit neighboring technologies; consequently, firms tend to make alterations in their practices in closely related technologies. In the view of Lippman and Rumelt (1982), this lock-in results from the uncertainty of imitators to match the efficiency of incumbents. As Rumelt (1984) subsequently noted, their view has the implication that firms should expand in areas related to their competence. In the general model of Arthur (1989), prior experience and joint economies among users reduce the costs of expanding into related technologies within the same trajectory, inducing an inertia against adopting an initially more costly but eventually more efficient alternative. Stiglitz (1987) has argued that the condition of localized learning, plus the costs of switching technologies, lock a country into a long-term development path. Being good at using the wrong technique can lock a country into a sub-optimal technology.

[13] See Swedenborg (1979) and Yamawaki (1990) on the pull of manufacturing to high wage countries; Cantwell (1989) on the relationship of the pull of direct investment to countries leading in the related technologies; and Kogut and Chang (1991) on the use of joint ventures by Japanese firms to enter industries where the U.S. invests proportionally more than Japan in R&D expenditures.

[14] See, for example, Levin, Klevorick and Winter (1987), Mansfield (1985), and Tilton (1971).

Though appealing, these formulations beg the question, in turn, what determines the distance between technologies or, equally so, the degree of the uncertainty of imitation? Ultimately, the analysis must turn to exploring this fundamental assumption. One candidate factor is the nature of the technology; that is, the degree to which it is tacit, codifiable, or part of a system (Rogers, 1971; Winter, 1987). On examination these dimensions are intrinsic properties not of the technology, but of the social knowledge of the firm and its nesting within the wider societal institutions (Kogut and Zander, 1990). Codifiability is relevant only to the extent that the parties know the codes and can communicate.

The issue extends, however, beyond the observation that the comprehensibility of a technology depends on a user's previous experience, educational level, or cultural background. The knowledge of a firm is expressed organizationally and institutionally. Its capabilities consist of its organizing abilities to transform the expertise of individuals and groups into saleable products. These capabilities, as informed by its proprietary data, reside in the routinized expectations built on a cumulative and shared experience. Learning is localized because knowledge is institutionally structured in on-going and enduring relationships. To adopt new practices requires a change in these relationships.

Learning is more difficult when the underlying knowledge is recipe- (i.e. know-how) based as opposed to information. The adoption of new technologies may require training and education of individuals in order to absorb *what* the relevant information is. But the adoption of new ways of doing things is complicated because it entails coordination of *how* groups behave and interact.

Of importance to understanding country capabilities is the recognition that some institutionalized relationships span firms. The capabilities of a firm reside not only in its know-how to transform the expertise of its employees into outputs, but also in the strengths of its institutional relationships with customers, suppliers, or sources of new technologies, e.g. universities. The focus upon domestic competition obscures the significance of these institutional linkages because they are often public goods to national companies. But international competition puts into relief the importance of these wider national capabilities and their contribution to the success of individual firms. In this important sense, then, the capabilities of a firm are nested in the wider institutional capabilities of a country.

INTRA-COUNTRY VERSUS INTER-COUNTRY DIFFUSION

The above discussion of the localness of knowledge as a consequence of the stable structure of relationships within a nation provides the basis for why country borders are less permeable than firm borders. The explanation for the difficulty of deciphering and diffusing organizing principles across national borders can be analyzed in terms of four factors: (1) technological opportunities, (2) selection forces, (3) identifiability, and (4) institutional lock-in. By our earlier discussion these factors define the institutional capability of a country, the process by which new techniques are selected and identified, and the degree of inertia of the current knowledge.

Technological opportunities

Technological opportunities are usually considered to be the potential for the application of basic sciences to economic activities, with the proximity of firms to universities and research centers playing a pivotal disseminating role. This view underestimates, however, the importance of research within firms (especially in countries such as Japan and Germany), as well as the dominant role of firms in the creation of new organizing techniques. In this wider perspective, technological opportunities include also the potential in the application of new methods of organizing, with inter-firm relationships as fundamental.

One of the most important results arising from the extensive work done on inter-firm networks in Sweden has been the long-term stability of relationships between buyers and suppliers.[15] It is, in fact, the importance of the ties within an industrial network which forms the basis of Hirschman's (1958) influential statement on the role of forward and backward linkages in economic development. Nor is the pull of these linkages isolated to developing economies.

[15] See, for example, Johanson and Mattsson (1987).

Scherer (1982) finds distinctive pattern of externalities among industries in technology flows for the American economy, a pattern that has been observed for other countries.[16] It is this inter-industry diffusion which leads to what Dahmen (1950), in his classic analysis of the growth of the Swedish economy, called 'industry blocks', that is, the spilling-over of technologies into related industries. An important factor in this spilling-over, was the previous experience of entrepreneurs, often from other industries.

As entrepreneurs tend to seek re-employment locally on the basis of accumulated relationships, the slower diffusion of technologies across borders can be partly explained by the immobility of skilled individuals.[17] But the current predominance of organized science over the single inventor suggests a related explanation of the importance of the geographical specificity of relationships among firms and organizations. The studies by Von Hippel (1988) have shown that

Selection pressures

As discussed earlier, selection pressures and competition are important drivers for innovative efforts, as well as for imitating competitors. To recognize new techniques often requires the pressure of competition in attracting scarce managerial attention (Winter, 1981). As national markets have, historically, been domestic in orientation, the competitive pressures behind selection forces have been largely other national firms. When it spills over borders, competition is, of course, a driver of learning in foreign markets as well.[20] The diffusion of Taylorism and Fordism into France made its first inroads in the auto industries, partly as a response to the competition from Ford's plants located in the United Kingdom (Moutet, 1975). It was only, however, the competition in the extreme guise of World War I which forced France, Germany,

see why this problem of identification is greater for learning organizational innovations as opposed to a product. The functionality of the product is usually clear: the causal relationship among firms. Through continual investments in monitoring and imitating each other, firms develop a capability to understand competitors and to adopt their frontier technologies and best practices. Part of a firm's knowledge is its cumulative understanding of competitors.

The problem of identification is, consequently, more troubling across borders than within a country, for two reasons. The first is best expressed by the concept of signal to noise.[22] Because of their similarity in organizing principles, firms are more sensitive to incremental differences among their domestic competitors. Since there are fewer differences it is easier to identify the factors responsible for differential performance.

Competition by a foreign firm eventually stimulates the search for the underlying advantages. In the absence of previous experience, comparison of the domestic organizational traits against one, or a few, foreign firms raises a surfeit of differences that may account for better performance. To apply a genetic analogy, the number of traits carried out by an organization is in excess of those with performance implications. Only through sufficient observations can the causal mechanisms be inferred, but unlike for domestic competitors, the accumulation of a long history of such observations is often missing.

A second and related reason for the difficulty of identifying the causal linkages responsible for success is the complexity of systemic dependencies. Transferring a just-in-time inventory system requires more than a change in factory procedure; it also involves a high degree of coordination with suppliers. Understanding the elements which need to be changed in tandem is a complex challenge. Deciphering the critical social underpinnings from a complex web of related parties is likely to proceed by trial and error. Because the system (e.g. supplier relationships, institutional connections, labor relations, etc.) which embeds these elements is more different between countries than between firms within the same country, the task of identifying causality is all the more

The issue of systemic dependence raises the question of the social feasibility of change. These considerations bring into play the contextual reasons for inertia that were omitted from our earlier treatment. Part of the persistence in inferior modes is that, even when the necessary changes are identified, they are not legally or politically feasible to enforce. This perspective was advanced strongly by Veblen (1915) in his analysis of the benefits of the late modernizer, but it has been further developed by Ames and Rosenberg (1963), Kindleberger (1969), and Salter (1966). In this view there is a cost to be an early starter, because technologies change over time, but property rights are slow to adjust.[23]

There is a message in this reasoning. To operate factories or offices at high levels of productivity may take levels of commitment and performance that are not acceptable in all cultures and countries. To adjust to new economic disturbances may also require unacceptable levels of labor mobility, both geographical and occupational. As long as people pursue non-monetary objectives, persistence in economically inferior social arrangements may be a country's choice.

COMPETITIVE CYCLES AND THE CURRENT DILEMMA

No country can attain leadership in absolute advantage without innovation in organizing principles of work. Of course, some countries may converge to (i.e. learn) best practice faster than others. It is this cycle of innovation, within and across country diffusion, and then the introduction of a new innovation (possibly by another country) that generates long-term patterns in competitiveness.

Knowledge is institutionally embedded, but so are the capabilities to learn. The speed by which

[22] See Bohn (1988) for an extensive development.

[23] See also the political blockage explanations of Crozier (1964), Olson (1982), Ouchi (1984), and Thurow (1982).

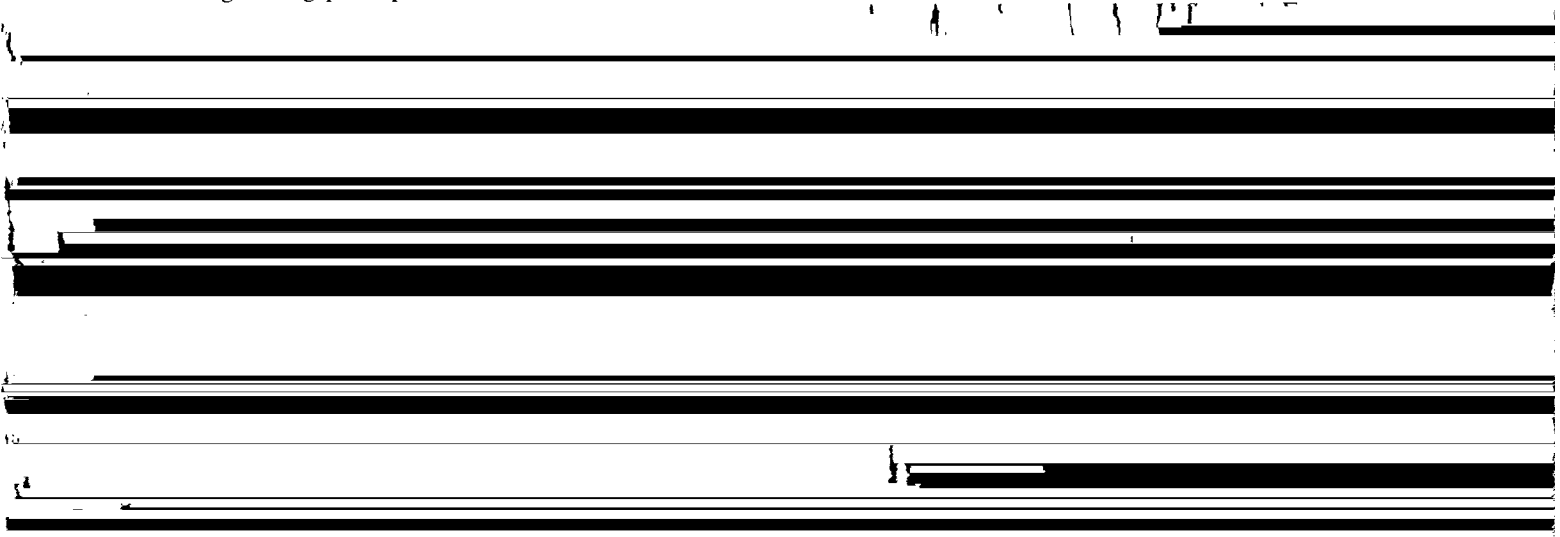
country capabilities leak across borders is also influenced by the orientation towards learning and the capabilities to learn of individual countries. It has often been noted that the transfer of technology is dependent strongly on the learning capability of the recipient (Hall and Johnson, 1970; Contractor, 1981). The ability to adopt new technologies requires previous investments and education in related areas. Nations do not individually need to be innovative, but their advancement depends upon their institutional capabilities to enjoy the spill-overs from the technological and economic advancement of other countries (Baumol, 1986; Volti, 1980).

Japanese firms have been frequently cited for their rapid assimilation of foreign technologies, and as exemplifying investments in learning to learn.[24] A wider historical perspective suggests, however, that the roles of imitator and innovator have often been interchanged among countries. It was the imitation of technology by the U.S. and France which was the concern of British manufacturers in the earlier part of the century. In the debates on the imposition of restrictions on the export of capital equipment and on the emigration of workers, Andrew Ure (1835) presented the argument that diffusion was of no significance as long as the Birmingham manufacturers remained on the frontier of technology. In fact, backward engineering, patent infringements, and employment of former workers were all practices in which American firms used to imitate British technology in the nineteenth century (Jeremy, 1981).

There is unlikely to be any simple explanation for this historical pattern of the transition of countries from imitators to innovators as they move into positions of leadership. It might well be that success through the ownership of superior organizing principles forces firms in a country to imitation of knowledge, organizations cannot easily shift from the former to the latter strategy. The organizational modes of the creation and assimilation of knowledge may not be compatible, not only because the allocation of investment and human resources differs, but also because of differences in the wider societal institutions, such as university-based research (Cole 1985; Westney and Sakakibara, 1985). Imitative capabilities are reflected in the organizational design and institutional relationships within and among firms.

Due to the difference in organizing principles, the transition from emphasizing product innovation to competing on an imitative strategy is equally problematic. Such a dilemma appears to have characterized the United Kingdom and to ail the United States. Finding the U.K. research and development efforts to be extraordinarily high, Peck (1968) suggested that the British government and firms should give greater recognition to an international division of labor in the allocation of research by spending less. A similar analysis and set recommendations are current in the debate on the loss of American competitiveness relative to Japan (Rosenberg and Steinmueller, 1988).

If the characterization of the persistence of the relatively declining country to overemphasize innovation is correct, these trends are not sustainable. Innovating firms in the U.S. will be forced to recognize that the returns to innovative activities are too low. Such a recognition places Japanese firms in an interesting dilemma, for their success poses the possibility of reducing the product innovation efforts of competitors, upon which they have often been dependent. It is not surprising, therefore, that not only have the R&D efforts of Japanese firms increased, but Japanese foreign direct investment has grown by the establishment of the R&D facilities and



likely to be rapid. Because different organizing principles are required for the innovation and organizing principles, while potentially placing a larger burden of innovation upon Japan. The

slowing of Japanese penetration overseas will arise out of the diffusion of its organizing principles, as well as the saturation of those by these principles.

There is growing evidence that Japanese organizing principles are diffusing to competitors, especially in the auto industry, with corresponding increases in productivity (MacDuffie and Krafcik, 1990). The response to Japanese competitive pressures in the auto industry has moved from wage-cutting to fundamental changes in the organization of factory work and labor rules, suggesting that a better identification of the sources of Japanese advantage has been achieved (Katz, 1985). Unquestionably, there remains room for further doses of superstitious learning before the organizing principles responsible for the success of Japanese firms are fully understood. But it is also clear that, by the time these differences are diffused, Japan's position in wealth, including its ownership of foreign assets, will be substantially greater than today.

However, the extent of the increase in Japan's wealth will be attenuated by the rate of learning among its foreign competitors. This rate will be influenced not only by diffusion of practices by Japanese subsidiaries, but also by the pulling of investment to Japan and the sourcing of the resident capabilities. There is, then, an important learning and the evolutionary rate of selection by which non-Japanese firms are displaced from markets. Three separate outcomes are thus possible:

1. Other nations will not adopt new practices, but will compete on older technologies and organizing principles at relatively lower wage and rental (i.e. income) levels.
2. Japanese practices will diffuse by the expansion of the Japanese share of overseas markets, either by exports or direct investment.
3. Firms in other nations will learn the new

CONCLUSIONS

The principal contention of the above argument is less a question of *what* product market strategies firms follow, but rather of *how* their productive activities are organized. Of course, there are other important elements. Clearly, issues that affect domestic competitive strategies can be extended to international competition. There are also strategic factors that pertain uniquely to international markets, and that can be analyzed largely in terms of variations in industry structure and consumer tastes among countries.

But variation in industry structure and consumer tastes provides only partial insight into competition within and across countries. Productivity and profitability variations among firms within industries have provoked the recognition that firm-level differences must be treated explicitly in the context of the evolution of industries. The perspective developed above accepts this recognition, with the twist that some of this variation is attributable to the effects of a firm's country of origin. Firms exploit internationally what they have developed domestically, but their capabilities partly reflect their enjoyment of the diffused skills and institutional strengths of their countries of origin. The study of comparative management and societal institutions among countries.

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