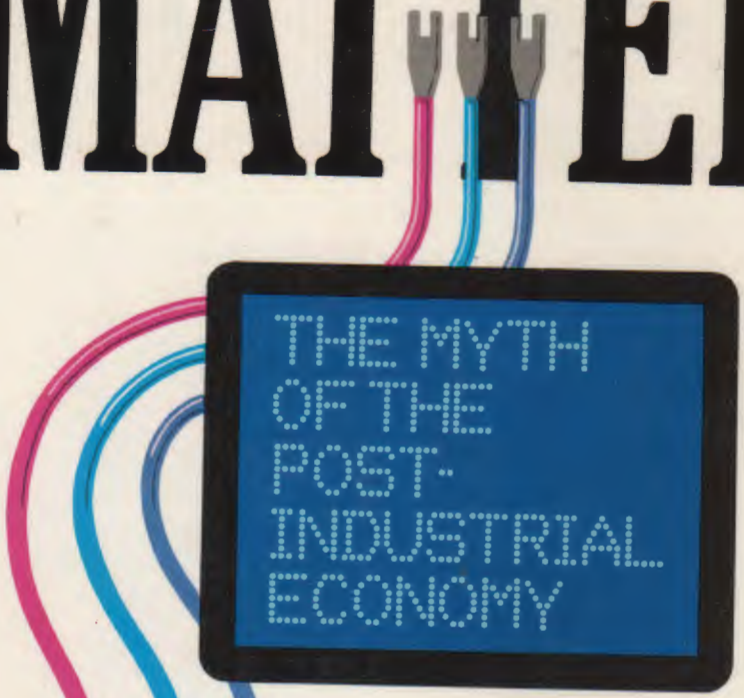
MANUFACTURING MATTERS



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Market Competition, Technological Development, and Trade

TRANSITION is a word that triggers a reaction—usually bored annoyance. After all, nothing is more permanent than transition, especially in economics. A healthy economy is always in a state of transition. And competitors are constantly struggling for a new product, new processes, and new kinds of efficiency. That's what makes the game so constructive; it keeps us on our toes and busy citing Schumpeter.[1] Economics abhors big and sudden movements. They are simply uncongenial to its way of thinking. Economics's basic formulation of problems, its theoretical base, is carefully tuned to marginal adjustments that sit atop large statistical bases. In conventional economics, change is rather steady and cumulative, compounding at 2, 3, sometimes even 5 percent a year. Big changes dilute in the statistical soup; their impacts on The System as a Whole are barely perceptible.

One can approach economic development differently and focus on disjunctions and dislocations and the conflicts that go along with them. Such an approach would argue that marginal changes often accumulate and then find rather sudden expression. It is rather like the California earth

on which we sit while we write. Deep down, about 50,000 feet below the surface, the Pacific and continental plates slide over one another steadily and gradually—at three centimeters per year—in a way that would delight econometricians. But the earth's crust does not move. It holds steady while the marginal changes quietly accumulate until a "readjustment" becomes compelling. Those readjustments—unlike the forces that produced them—are neither gradual and marginal nor smooth. The changes cannot be understood simply as an accumulation of marginal shifts. Basic changes in markets and technologies do produce radical and abrupt changes in the market position of firms, the international position of national industries, and the relative economic strength of nations.

This chapter develops an optic to permit us to conceive America's problem, to allow us to see the issues. We want to convince the reader that radical changes in the patterns of growth and the positions of firms, industries, and nations occur. We wish the reader to understand that how Americans respond to transition will shape this country's future. We try to develop not a formal theory, but a set of analytical tools that will permit us to unravel the significance of the changes we are witnessing.

Technological Change and Market Position

Sharp changes in technology or markets can create abrupt and often irreversible shifts in the market position of firms. The basic notion here is very simple. The corporate skills it took to be a winner in one technology may not meet requirements imposed by new technologies. The strategy that succeeded with one set of competitors and a particular set of technologies may fail radically when the market changes. Thus, American producers of television sets had been very successful, but they were unable to adjust to a new mix of product and production strategies adopted by Japanese producers. Likewise, American producers of electron tubes never became important producers of microelectronics.[2] Let us put what happened a bit formally. Static efficiency, the ability to maximize profits under stable conditions, did not assure dynamic efficiency, the capacity to adapt to rapidly changing circumstances.[3] The national, or corporate, capacity to adjust to the changing demands of markets and technologies will prove to be a central part of our story.

A firm's failure to manage a changed market is usually clear and easily explained after the fact, but there is no simple way to predict when a firm

will survive a transformation of technology or a shift in competitors and the terms of competition. This is unfortunate, for theoretical elegance has its own attraction, and in this case it would have practical and profitable applications as well. We can find some partial explanations for success and failure by systematically analyzing the ability of a set of firms to manage change. But we should not be tricked into pursuing complete explanations and absolute certainty—not just because the knowledge required would be costly to obtain or because any theory would be difficult to establish—but because much will always remain inherently unpredictable.[4]

Established firms sometimes slip. New firms based on new technologies are often able to establish for themselves enduring positions in traditional markets or establish entirely new markets. RCA and General Electric (GE) were established producers of electron tubes, but they did not succeed with the replacement technology, semiconductors. A new series of firms —Texas Instruments and Fairchild, to name two—created a place for themselves and became industry leaders. Through a later window of opportunity created by a new round of technological development, Advanced Micro Devices (AMD), Intel, and National Semiconductor, to name a few, entered the industry. Then in the next round of innovation Japan's giants such as NEC (Nippon Electric Company), Hitachi, and Matsushita—along with a newcomer, Sony—made their entrance on the world stage. Unlike the American integrated electronics firms that stumbled along the way, the Japanese companies made the transition from electron tubes to microchips. They built powerful world positions both in consumer electronics and, ultimately, in microelectronics. A British firm introduced the first commercial jet transport, the Comet, but the plane's failures (it crashed with some regularity as a result of early design failures) pushed it out of the market and opened the doors for twenty-five years of American domination of world aircraft markets. At the same time, the Comet's failure helped provide the knowledge for other producers to create safer planes which finally altered air travel.

An established market position does not assure a capacity to react to radical change and can consequently be washed away quite quickly,[5] but established firms often do hold on. The clearest and best example is IBM. IBM, an established U.S. producer of electromechanical equipment, did make the transition to electronic computers. In the present period the question is whether IBM can adapt to an era when the bases of competitive advantage in the computer industry are shifting. Boeing has adjusted effectively to sharp changes in the types of planes demanded, to dramatic rises and falls in the number of planes demanded, and to the emergence of a new kind of competitive threat in the European Airbus consortium.

Market positions can change quickly, and then equally quickly become fixed and difficult to reverse.[6] The opening for radical readjustment can close rapidly. Fluid situations freeze. After a brief moment when drastic shifts are possible, an industry returns to more normal circumstances of progressive or marginal change. Barriers to entry or obstacles to expansion are built up as new dominant technologies and business organizations or strategies are established. It is for this reason that mature industries have stable structures.

As market conditions shift and technology frontiers advance, firms respond by bringing new products to market and new processes to production. To do so, they invest in people and equipment. A body of know-how —the unquantifiable "art" of technology—builds up inside the firm as proprietary knowledge. Many processes are closer to recipes than to formulae. An implicit or explicit strategy then emerges. The collected investment, as well as the strategies and habits needed to use it, entrench the position of the successful firm or nation for the duration of the technology's market importance. Industrial organization becomes settled once again.

Examples abound. U.S. Steel had a dominant position in the 1950s in open-hearth production technologies. In the 1960s, using basic oxygen furnace technology (a production innovation developed in Austria), Japanese producers established themselves as the dominant low-cost producers.[7] In autos, electronics, and aircraft, corporate positions become entrenched as competition involving radical innovation in the nature of the product gives way to incremental innovation. But at the beginning of a market battle for new technologies, the position of the players is usually very fluid. As the investments consolidate, the market positions become more rigid. Positions can erode, but massive investment or another innovation may be required to change them.

Each type of innovation may require distinct specialties for the innovating firm to establish itself, for a follower to capture market position, or for an entrenched firm to respond. We may be able, as David Teece suggests, to define the conditions within which an innovator can establish itself and the type of assets a firm may require to commercialize an innovation.[8] Decisive assets required to complement the innovation are those which cannot simply be bought immediately, but which themselves are a proprietary resource. Sometimes a marketing channel may be required. For pharmaceutical innovations such channels have proven decisive. Indeed, biotechnology firms that are creating new products are now moving to build such channels in anticipation of their products. Techniques of biogenetic engineering permit a range of product innovations. Achieving entry

requires establishing the vital complementary assets to support the new products. In other cases distinctive manufacturing capacities may be at issue. Xerox was unable to produce its Star word processor cheaply enough to attack the market outside the office, or rather its production costs were so high that it could only sell to the office. American semiconductor firms, which have innovated a range of products, now find it difficult to capture the gains from innovation in a direct manufacturing competition with Japanese rivals. In one sense this is a narrowly defined business strategy question. Which assets must an innovating firm establish if it hopes to capture the gains from its innovations? Which assets can an established firm use to hold market when attempting to imitate the innovator? In another sense, there is a historical question. In different historical periods different problems had to be resolved. In the late nineteenth and early twentieth centuries the creation of mass production systems and national distribution channels were decisive. Today, once again, manufacturing abilities are decisive. To see even the business strategy problem we must adopt a language that permits us to see historical evolution.

This suggests a first conclusion about how to approach problems of radical change. We cannot use the tools appropriate to more static periods; questions about efficiency give way to issues of effectiveness at perceiving and managing change. The issue in every case—whether the firm uses a radical change to establish itself or conversely whether it is displaced—will be *whether the resources, habits, and strategies that the firm had built up in one period could be applied to the tasks of the next period.* Did a firm's existing capacities match the new tasks it faced, or could it at least develop new capacities fast enough to respond to the tasks at hand and hold position. As we proceed we will see that the same may be true for nations.

Technological Plasticity and National Settings

An important lesson about the nature of technological development lies in the process by which market positions freeze after periods of fluidity. That lesson will matter as this discussion unfolds. The possibilities at the beginning of a technical transition are broad, but they narrow over time. Know-how accumulates around a particular technology. As the investment builds around the products that are succeeding in the market, alternative technical solutions become economically less attractive. Funds for experimentation in these areas dry up. Continued development therefore tends to follow lines already established.

The development of automobile engines is illustrative. One way of increasing fuel efficiency is to make cars lighter. One of the heavier components of the car is the engine. Engines could be made lighter by substituting aluminum for iron. But aluminum, though lighter, is not as durable, as strong, or as easy to manipulate in engine manufacturing processes. The technological question became whether to try to make aluminum stronger or to reduce the amount of iron in an engine to make it lighter. Iron won out in mass-production cars not because of its inherent properties, but because automobile engineers had much greater knowledge about it and experience with it.[9]

The direction of technological development, then, is not determined by inherent technical characteristics or by any economic advantage that will accrue to all producers.[10] Instead, it is inherently uncertain. It depends in critical ways on chance, social conditions, corporate strategy and choice, and government policy. Take government as a case. Regulations influence the direction of private investment, and public investments shape the economic infrastructure. Because both government policy and corporate strategy will vary in different nations, the direction of technological development will also differ from nation to nation. At any moment the state of science, engineering, and know-how will define a "technical possibility set." But they do not define which options in the set of possibilities are exploited.

Innovations emerge from complex interaction between three factors: market demands as expressed in prices, needs that might be satisfied but are not yet expressed by buyers and sellers in the marketplace, and new additions to the "technical pool." Certainly technology is not plastic, shaped to our will. Not all things are technically possible, but technology has no internal logic that inevitably dictates its evolution or use. Technological development does not drive society as it evolves, rather technology itself is shaped by social development. Moments of radical shifts in technology, periods of transition, are periods when political choice can exert some control over technology. Technological and social development are interactive, shaped by and shaping each other.

This line of reasoning leads us to several conclusions. If technological development is inherently uncertain, then the most conservative national or firm strategy for assuring the success of a development is to spread one's bets.[11] The best analogy is to covering the table at the roulette wheel. Some might see this as a form of redundancy. We would argue that it is not. A spare tire is redundant, but it is essential if there is a flat tire. A second phone line provides a cushion of capacity if the first one is in use. Both are identical to the apparatus they replace. They are quite literally redundant, or extra, during ordinary conditions. Bets on a roulette wheel, how-

ever, are not identical; each is valuable precisely because it is different from the others. In terms of static efficiency, the extra or unused efforts would be duplications, wasted effort. In dynamic terms, the extra options are essential to guarantee success.

Technology managers have often recognized this. Indeed, the Polaris submarine development program built multiple bets into the program at critical technological junctures.[12] The biggest technical uncertainty was whether the missiles could be fired from below the surface, and a set of different projects were undertaken to solve the firing problem.

The multiple bets that technological development requires will not be placed evenly around the table. Instead, they will cluster in two areas, according to two principles. First, research and development bets will be historically rooted. They will reflect the past development of the firm and the national economy and tend to follow the direction of past work. The resources available for tackling the next round of technical problems will reflect what comes before. Technology has history. Second, the needs to which the technology is being applied will be different in each national community, and so the technological tasks will vary. The implications of these two principles around which technology bets cluster on the roulette table are significant.

If we accept these two principles, we are led to a range of conclusions. When a technology is in its infancy, and still fluid, the line of its technical evolution is inherently uncertain. This is not to say all things are possible, but rather that more than one direction of development is possible. An emphasis can be put on making steel stronger or lighter. The pace and direction of development is a matter of decision. The direction a technology takes will depend partly on circumstance and individual choices. The directions of effort and evolution are set by the cluster of the technology bets. The outcome, the winners among competing possibilities, emerges when the sunken investment becomes so great that radical alternatives are too pricy. Broad market acceptance of a new technology, for whatever reason—be it public relations or real performance—excludes new possibilities. After positions freeze, a radically new technology will not be developed unless it is so attractive that producers and users are willing to walk away from their investments in earlier technologies. If the gains from new technical approaches look marginal, they will be ignored; if gains look potentially important but slow to develop or very risky, they may never be captured.

Technological development is shaped by the community in which it occurs. It is not, as many analyses suggest, an independent force shaping the economy or the society.[13] During ordinary times, when national differ-

ences produce only small branches off the main trunk of technological evolution, the ability of society to shape technology is not nearly as visible as the powerful constraints that mature technologies have set for society. Alternate routes—the roads not taken—are hidden in the past. In periods of transition, however, the direction of technology itself—its branches, not its twigs—is affected by the clustering of bets. The direction in which the investment develops will be heavily influenced by where the bets are placed. That placement will depend on the needs of the national community and the resources built up during its previous development. Thus, the bet "placer"—be it a company or a nation—actively shapes technological development. As the new branches grow, they block others from emerging.

National context, by setting the cluster of bets, shapes technology. Computer technology, for example, could grow along several different lines in the next years. The line that wins out will reflect the historical contours and current needs of its community of origin. By blocking other options, the winning route is imposed by sustained investment on other communities. Because the winning and then dominant technological route reflects, at least in part, the historical roots and national needs of a specific community, it gives at least an initial advantage to the innovating country. The technology emerges from and plays to the national strength of the innovating country. The winning technology always imposes its own constraints, and once set, it can shape the patterns of trade. Technology *becomes* a binding parameter; it does not begin as one.

Winning and Losing in a Set of Industries

Advantage can shift in a set of sectors quite as rapidly as in one sector. Changes in the welfare of a single firm or even a single sector will rarely if ever affect the pace of national development, but if a set of firms in a particular community or a set of industries in a region or nation begin to lose market position, the economic as well as the social and political consequences can be substantial. The present problem facing the United States is that it is losing competitive advantage and market position in a range of manufacturing sectors. These do not appear to be a set of separate stories, each with its own special circumstances. They appear to be related manifestations of the same fundamental problem. The United States seems to be losing the dominance in manufacturing established early in this century with the twin innovations of mass production and the giant firm.

Consequently, America's ability to hold or appropriate the gains from product innovation within this country is weakened. Production technologies developed when the American market was insulated may have been rendered vulnerable to production technologies developed during rapid growth in Asia. The corporate capacities built up during the period of dominance appear inappropriate at best and actual handicaps at worst. New capacities will have to be created to match the tasks confronting America in the present transition.

The basis of competitive advantage in many sectors or industries, each seemingly distinct, often depends on the same thing. That critical element common to a range of sectors may be dependence on the same transportation facilities, or on the price of labor or energy, or on a specific factor of production. Apparel, shoes, and footwear, for example, have traditionally depended heavily on inexpensive labor, so as unit labor costs have grown, the cost of production has risen in these sectors, and all three find it harder to compete internationally. Similarly, aluminum and petrochemicals are both energy-intensive goods, so when energy costs rise, their production costs jump. Each becomes less competitive with alternative materials.

More important for our story, several industries may depend on a common understanding of production and a similar set of skills for sustaining it. Thus, Sweden's export advantage, critical in that small and trade-dependent high-wage country, lay in ending industries in which advantage rested on design, engineering, and efficient production—ship building and auto manufacture, for example. These are all metal-bending industries. Production in these industries rested on a roughly similar set of skills and a similar approach to manufacturing. Indeed, a Swedish national deal between labor and industry rested on the ability to move labor from one similar industry to another when advantage in world markets shifted. This set of Swedish engineering and metal-bending industries were thrown into crisis in the 1970s when similar goods were produced with lower-cost labor and roughly the same production technology in the newly industrializing countries. In other words, when standard production technologies were transferred to nations with cheap labor, Sweden was in trouble.

In the 1970s, it became apparent that the Japanese had made basic innovations in mass production. Their advantage in world manufacturing came to lie with these innovations—not, as was often argued then, simply with lower labor costs. In a range of sectors—best exemplified by durable consumer goods such as television sets, automobiles, and cameras—Japanese production now uses less labor per unit of production than American production.[14] The innovations have been given a variety of labels: "just-

in-time production" refers to the management of component flows, and "total quality control" refers to the shift of quality responsibility from staff to the production line. "Flexible manufacturing" suggests the capacity to vary volumes and types of products. As these labels suggest, there is constant tinkering with the production system to strip away unnecessary labor and to adapt, improve, and create new production equipment.[15] The system also rests on and creates a distinct pool of management and labor skills that provide the basis for its further development.

The mass production system that emerged in the United States sixty years ago also produced, in its day, a common approach to manufacturing, a commonly held view of the links between manufacturing and product and price strategy, and a pool of skills and technologies to implement that view. As the system emerged it made America the dominant world producer, capable of supplying the world with war material during World War II.

Such common approaches to manufacturing can often be seen in the machines with which other products are made. Thus the machine tool industry is one "carrier" of knowledge about how to manufacture. As Nathan Rosenberg has written: "because these processes and problems [in machine tool making] became common to the production of a wide range of disparate commodities," industries that were apparently unrelated "became very very closely related (technologically convergent) on a technological basis—for example, firearms, sewing machines, and bicycles."[16] The mass production system, as it developed, generated a conventional wisdom about machines, the uses of machines, and labor organization. Today, many of the traditional skills and organizational techniques are, in fact, obstacles to effective production. To understand the transition we will look carefully at the evolution of production equipment.

Production innovations that influence several industrial sectors can rapidly alter a nation's trade position in international markets. They involve common underlying approaches to manufacturing that cut across whole sets of industries; for that reason, imitating them quickly in large established firms that have built different strategies on massive sunken investment in organization and machines is very difficult. The weakness in the old system must be identified; the direction of production innovation spelled out; the resources to implement a new strategy provided; and the mass of middle management convinced that the company must and can change direction. Accomplishing such changes in one firm is hard; doing it in the fabric of an entire economy can be very slow if possible at all. These innovations become cross-sectoral because they reflect common, widely shared approaches to manufacturing; for the same reason, they are

very difficult to imitate immediately in other countries. The consumer durables industry suggests the problem. Its various products, in which production rests on the management of complex processes, provide the high-wage jobs essential to a wealthy economy. But the accumulated mastery of manufacturing can be rendered obsolete. If advantage is lost suddenly in these sectors, as it has been, the problem of adjustment—how to move from declining to expanding sectors—becomes much more serious. The market may not be able to absorb the workers and the capital released, and the result may be a drop in real wages like the one experienced in the United States over the last ten years. America may not have to worry much about the loss of competitiveness in a single sector. However, when we see difficulties in the whole set of sectors in which competitiveness depends heavily on common manufacturing skills, we should be very concerned indeed.

The Interconnections Between Sectors: Change Spreads Throughout the Economy

Radical shifts in the international competitive position of one sector or set of sectors can reverberate throughout the economy. Nothing less than America's position in the international hierarchy of wealth and power can be at stake. Competitive or technical developments in one industry always have effects in the sectors to which that industry is connected. In this period of radical shift, those interconnections become decisive. They affect the level of output in the economy, but even more importantly they shape the process of technological development and diffusion which underlies competitiveness for the firm and productivity growth for the economy.

The most obvious connection is that industries buy from and sell to each other. The expansion of the cotton industry in Britain encouraged investment in industries that produced and sold the machines needed to make textiles.[17] Railroads and, later, interstate highways lowered transportation costs and altered the character of America's national markets. Once Ohio was the Far West, and it was harder to travel from Philadelphia to New York than it is now to travel from San Francisco to Tokyo. The railroad industry bought steel in the form of rails, encouraging the expansion of the steel industry. Some seventy years later the automobile industry played the same role, creating demand for rubber, cement, glass, and more. Today the nation's telecommunications systems are being reorgan-

ized so that networks which once carried only voice can begin to carry data as well; that reorganization itself is provoking secondary investment, which will shape the evolution of the computer industry and also alter business management and communications. The expansion of the electronics industries rests on a national pool of skills and knowledge, as the expansion of German chemical industries did nearly a hundred years earlier. Germany forged an advantage in industries that required an educated work force, research, and heavy investment. From a historical perspective, strategic industries whose growth promotes expansion in related sectors—industries such as automobiles or textiles, whose own development at a critical moment generated enough power to move an entire economy forward—stand out. Automobiles, for example, established a scale and form of production that was then imitated in a set of similar and related sectors.

Conversely, the decline of a central industry can unravel the industrial combines built up around it. In Britain, when auto imports rose from 10 percent to 50 percent of domestic demand without any compensating increase in exports, demand dropped for steel, machines, and glass.[18] We can quantify the volumes lost. But the impact on the steel, machine, and glass sectors is greater than the quantities and harder to assess. The drop in sales represents lost profits, lost volumes required for efficient production, potential labor problems, and a failure to sustain investment in machine innovation in the face of declining sales by final users. Certainly the troubles in the auto sector reflected problems throughout the British economy. The market was penetrated by foreign producers because British companies were badly organized and inefficient producers. The troubles in the auto sector, though, contributed to the general erosion. Decline, like expansion, is cumulative. Manufacturing sectors are linked together, just as services are linked to manufacturing.

The sectors that are critical for the continued development of the economy cannot be easily distinguished from those that are not. The French in the early 1980s used the word *filière* to refer to the fact that there are critical interrelations in pieces of the economy. This amounts to conceiving of the economy as a series of vertically integrated strands. An electronics *filière*,[19] for example, refers to the fact that silicon is transformed into microchips which are put into computers, which are used in telecommunications equipment, which serves as a link inside and between companies and communities. But the notion of a *filière* is no more useful than an input-output table in determining the strategic links in an economy, or what their character is. It doesn't answer the question—for a firm or a government—of where to invest. As one French businessman remarked: "It all depends on where you are in the *filière*." He meant that

some pieces of the electronics industry are profitable for a company, but some aren't profitable. The notion of *filière* doesn't answer, for a government or a corporation, the strategic policy question: Which segments are vital and ought to be supported? It doesn't indicate whether a semiconductor chip should be treated like a ball bearing that can easily be imported or like a vital electronic system that might have to be developed at home. Nor does it tell whether the loss of the capacity to produce semiconductor chips competitively blocks the path to more vital electronics capacities. Worst of all, the answers don't stay the same as the industries evolve.

Overemphasizing the sectoral ties—from the view that since all things are connected to each other, all are critical—leads quickly to a defense of autarchy. At the other extreme, ignoring them leads to a view of the economy as a scattering of different industries that have only remote connections with each other. The task, we repeat, is to identify which sectors are strategic, which nodes of interconnection are vital.

What matters to us most are the links that promote ongoing market adaptation and technological innovation. Advanced computers and telecommunications equipment depend on innovation in electronic devices. An expanding telecom industry provides a market for computers and microelectronics components. Japan's early advantage in certain advanced semiconductor products—for example, CMOS (complementary metal on silicon) memory chips[20]—was built on its market position in consumer electronics. This instance suggests a broader conclusion: advantage in a national economy is embodied not simply in the capacities of specific firms but in the web of interconnections that establishes possibilities for all firms.

Technological innovation depends on a series of subtle and complex interconnections. Knowledge of auto manufacturing or airplane manufacturing promotes innovation in machine tools, and advances in machine tools permit production innovation in many other industries. The widespread technological interplay involving small improvements may be even more important than the dazzling breakthroughs. Nathan Rosenberg has summarized the complexity of this interplay well:

> The ways in which technological changes coming from one industry constitute sources of technological progress and productivity growth in other industries defy easy summary or categorization. In some cases the relationships have evolved over a considerable period of time, so that relatively stable relationships have emerged between an industry and its supplier of capital goods. . . .
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> Often, however, an innovation from outside will not merely reduce the

like a piece of fabric that unravels when one strand is broken, nor is it like a ball of putty that is easily molded back into a whole after one piece is removed. Looking backward, it is always possible to see the lines connecting one technology to the next. But it is hard to identify in advance the critical sectoral nodes where innovation will be induced. Perhaps there are a small number of possible nodes of technological synergy. We cannot know which will be critical until the technology twists along its uncertain course. Sometimes—as now, when a basic change has already begun—we may be aware of the river but still unable to predict its future course. At such times it becomes crucial to know whether public policy can direct the course of the rivers or transform their energy into national development. As we shall argue, the technological choices will depend in substantial measure on the skill levels in the work force and the character of labor conflict in the national economy.

We are arguing that the mix of manufacturing activities shapes the potential for development of the economy. We choose the word "development" intentionally. The notion of growth as used by economists implies a bloodless, smooth, and quite mechanical process. There are shifts and movements, but not disjunctures and dislocations. Development implies transformation. Those looking at the newly industrializing countries today or at the history of the now advanced countries can see clearly the dislocations, can see the fights and struggles that were settled in some countries in a way that permitted the accumulation economists call "growth" to proceed.

We are suggesting that the composition of production matters, contrary to the received wisdom that the mix of production activities does not affect America's economic possibilities. The composition of production ought to be a concern of policy. The present mix and organization of production, we suggest, has various implications for economic expansion and innovation. First, different sectors have different potential for growth or face different degrees of foreign competition and have different capacities to resist that competition. Let us take one simpleminded instance. The apparel industry in the advanced industrial countries will expand slowly. Populations are reasonably well clothed. Additional personal income will be spent on other goods. By contrast, the demand for telecommunications equipment of all kinds has begun to explode. In a world of only two industries with total national specialization, apparel and telecommunications equipment, countries of apparel makers will in this period grow more slowly than nations of telecommunications producers. Second, we have seen how the ability of any given sector to adjust and develop depends, in part, on the mix of other industries in the economy. In some cases the

links between sectors may cross national borders. A sophisticated electronics and automated equipment sector permits the textile companies and unions to dream of reorganization of the apparel industry and then act to achieve it. In the U.S. textile industry much of the vital production technology was imported from abroad. However, in other cases, making links within the national economy creates real advantages and speeds the development of the most advanced technologies and the applications of these new possibilities to traditional industries. National economies, each with a different manufacturing base or production profile, differ in their potential for future growth.

Some have argued, as we noted, that at any given moment particular industries are economically strategic[23]—that is, certain sectors are at the center of a web of technical evolutions and developments that will reshape the entire economy. The mastery of steam engines altered the application of energy to manufacturing throughout Europe. Its use in rail transportation altered economic and social distances. The emergence of the modern chemical industries created new products and altered old ones. The expansion of the automobile industries had a similar effect. There are elaborate theories that would argue formally that growth moves in spurts, driven by waves of technological development.[24] But we do not need an entire theory of growth to contend that those countries solidly placed in these strategic industries which symbolize the transition and which have a web of sectoral interconnections that permit the industries that are driving the technological advance to influence more traditional industries are better situated for sustained expansion.

The Japanese Ministry of International Trade and Industry (MITI), of course, is held up as proof that such sectors can be identified and their development supported. When Japan was a backward economy it could see the outlines of its economic future in the structures of its competitors' economies. Many have noted the criteria it chose to spot its future. The primary criteria were: (1) income elasticity—would demand for products grow as Japan got richer; (2) scale and learning curve economies—would the price of the goods drop as the volume produced grew; (3) would their expansion drag the economy along in their wake; and (4) could they become export industries.[25]

Now that Japan is a fully advanced economy, seeing the future in the tea leaves of foreign economies is no longer possible. Yet MITI continues to target or focus attention, investment, and research on particular areas. Those areas now are electronics, biotechnology, and new materials. Do the Japanese know something the Americans do not that allows them to predict the future? Are they simply following the U.S. stock market?[26] If so,

their predictions are confirming ours and ours theirs, because importance is assigned by American investors to Japanese policy judgments, and apparently Japanese policy judgments take account of the choices of American investors.

The targeted technologies all have one characteristic in common. They are transformative technologies—that is, they are inputs to the products and production processes of other sectors and consequently transform those industries through their evolution. As a result, they possess the potential of affecting the economy at large. There is substantial evidence that, as the technologies are mastered, production costs will come down and that they will be export sectors. Importantly, they all are likely to reduce imported materials inputs into each increment of GNP. In other words, the Japanese will use less in the way of imported raw materials to grow. For a resource-poor economy that must export to survive, the social gains from following a technology path that reduces import requirements are enormous. Whether the Japanese are right in their judgment that demand for these products will grow—independent of government policy—may not matter. By focusing attention and investment, the Japanese may provoke new technology paths that they can dominate. Simply, the prophecies of technological and industrial centrality can—for transformative industries with real potential—become self-confirming.

We must emphasize this. The so-called high technology industries are in fact transformative sectors. The products and process alter or transform the goods and production arrangements throughout the economy, that is they alter the choices open to firms and the very nature and definition of markets. To put it technically, the interindustry spillovers are enormous and can potentially influence a nation's industrial structure. Hence we use the notion of transformative technologies emerging from transformative sectors.

Precisely because the new technologies involve the emergence of new sectors and reopen and disrupt established competitive patterns in traditional sectors, they make competition a strategic game. It is not simply one in which the clear constraints of competition in perfect markets bound the choices and possibilities of firms. Rather the decisions of particular firms, and often of governments, alter the market by changing the possibilities of other firms in the industry. Competition in emerging and transforming sectors does not follow the model of perfect competition so dear to economic analysis. Markets in these cases are inherently imperfect and the outcomes—what firms produce and where—are powerfully and often in an enduring way shaped by corporate strategic decisions and government policy. Indeed we have argued in this chapter that an initial position by

a firm or a nation in these sectors can become enduring. Put technically, the dominant firms as an industry congeals into a more enduring form can control a stream of product and process innovation that makes market entry much harder for followers.*

The national production profile—the distribution of industries in the manufacturing base—describes a country's economic present. It also structures the country's industrial future. The question for the United States is not simply whether it has a manufacturing base, but what its composition will be and what potential for growth it embodies. Since national economies differ in their structures or production profiles, they represent different national futures. The opportunities for economic expansion and innovation tomorrow differ with the sectoral mix of production today. There are fast and slow roads of economic growth. How well America manages today's transition will determine its economic future for a long time to come.

National Shifts, Trade, and Technological Change

The American transition will not take place in isolation. It is taking place as part of an intense international competition. New technologies such as microelectronics open up possibilities; but the speed with which they are adopted and the purposes to which they are put are pressed by international competition—the need for firms to create, defend, and reestablish competitive positions in trade. Corporate reshuffling will take place across national borders, with clear implications for national economic positions.

Trade affects national position during the transition in three main ways. First, the corporate shifts that often attend technological development alter national positions if advantage moves from firms of one nation to those of another. Second, a single innovation—a machine, an electronic device, a way of producing—may affect a range of industries. It may, for example, advance the international position of a set of user industries. The chief trade question in this case is whether the innovation—and the know-

*Note that the new trade theorists create the possibility of strategic behavior altering industrial outcomes. However they are far too conservative in their evaluation of the consequences of such strategic behavior. They underestimate interindustry spillovers, discount the possibility that such spillovers will stay within one national community, and assume exogenous technological advance. Limiting the analysis permits a more careful evaluation of each argument, but only the assembly of the pieces emphasizes the importance of a dynamic not static equilibrium approach.

their predictions are confirming ours and ours theirs, because importance is assigned by American investors to Japanese policy judgments, and apparently Japanese policy judgments take account of the choices of American investors.

The targeted technologies all have one characteristic in common. They are transformative technologies—that is, they are inputs to the products and production processes of other sectors and consequently transform those industries through their evolution. As a result, they possess the potential of affecting the economy at large. There is substantial evidence that, as the technologies are mastered, production costs will come down and that they will be export sectors. Importantly, they all are likely to reduce imported materials inputs into each increment of GNP. In other words, the Japanese will use less in the way of imported raw materials to grow. For a resource-poor economy that must export to survive, the social gains from following a technology path that reduces import requirements are enormous. Whether the Japanese are right in their judgment that demand for these products will grow—independent of government policy—may not matter. By focusing attention and investment, the Japanese may provoke new technology paths that they can dominate. Simply, the prophecies of technological and industrial centrality can—for transformative industries with real potential—become self-confirming.

We must emphasize this. The so-called high technology industries are in fact transformative sectors. The products and process alter or transform the goods and production arrangements throughout the economy, that is they alter the choices open to firms and the very nature and definition of markets. To put it technically, the interindustry spillovers are enormous and can potentially influence a nation's industrial structure. Hence we use the notion of transformative technologies emerging from transformative sectors.

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how to use it effectively—can be easily obtained by foreign firms. Can the Japanese obtain critical semiconductor product technology from the United States? Can the Americans obtain production know-how in Japan? Can the Europeans obtain from the United States or Japan vital microelectronics design capacity to implement new electronic systems? Third, the interconnections that permit continued innovation may be unraveled by the loss of a specific firm or set of firms. Does continued innovation in textile manufacture depend on a national textile equipment industry? Can American textile firms obtain needed production equipment and know-how quickly enough to adjust their strategies? The vital question here is whether a nation's firms can innovate in the application of new technology, if not in its direct development. If a sector declines, it may lose its capacity to spark innovation in linked industries. And since trade between the advanced nations rests in part on technological advantages, often quite minor ones, a decline in critical sectors can threaten to unravel the whole web of technological connections that sustain innovation and growth in an economy. Recognition of this risk, however, should not push America to seek self-sufficiency in the development of technology or cut itself off from vital foreign sources of technological development. Technology can be imported; it often is. Japan would not have succeeded if it had not borrowed technology. U.S. policy makers must not be swayed by the narrow profit motives of American producers, who may defend autonomy as a means of obtaining protection for themselves; they must judge which streams of technology can be imported. And technology can be imported in various forms: as product, through licenses, in the form of direct investment, or as services.

There is another dimension of the problem. Governments with distinctly different priorities and capacities for action are involved. There are political asymmetries. Certainly each nation must live with the priorities it chooses, a matter to which we will return in the final chapter. However, there is one issue we wish to note but not develop. Do the efforts of one advanced country to promote its own technological and industrial development limit the ability of its trade partners to achieve theirs? The answer is, it all depends. It depends, in the first place, on the nature of the promotion policies being used to support technological development. The link between domestic support of R&D, on the one hand, and closed markets or limited access to commercial technology, on the other, is crucial. Protection can backfire seriously if the protected firms cannot use it to establish themselves in world markets. However, if they do become important world competitors, then domestic protection has serious international consequences. Domestic markets that are closed to foreigners can certainly

deny foreigners some potential sales. More important, the protected home market can serve as a launching pad for new products, a safe haven in which local producers can gain experience in new products or in new sectors before entering international competition. Much evidence now suggests that when an initial position in a domestic market serves to establish producers in world markets, those producers are usually able to defend their home terrain against foreign competitors when protection is lifted. If demand for the new good is promoted in the closed market, the pace of national development is accelerated. When foreign producers are prevented from competing in this launch market, it makes it harder for them to stay in touch with the lines of technological development emerging in the protected country. If the government in the protected country promotes generic technologies of commercial significance—that is, if it helps solve technical problems that appear in a range of products—it may speed the development of its own producers. Whether it succeeds will depend crucially on whether the new research is open to foreign producers as well as to domestic ones. Policy objectives may not be realized; ambition does not translate automatically into reality. But the *potential* for policy to consciously shape technological development is definitely there.

There are no simple rules to apply in guiding policy. The proper choices will differ from sector to sector and will change with the competitive situation and tactical position of the firms involved. And there is real uncertainty about the direction technological development will take. This may be frustrating to policy makers who want clear guidelines; but imposing a pattern where none exists can only lead to continuous policy mistakes.

Premises of the Debate: A Summary of Conclusions

We have now developed six hypotheses that will be used as premises from here on in, so they merit repetition. First, technological developments can provoke rapid market shifts. Second, technologies are shaped by the needs and arrangements that exist in the nations from which they emerge. Third, some critical technologies can affect the competitive position of a whole range of industries; and if one nation uses these technologies to gain a lead in a vital product, it can forge an important trade advantage for itself. These are *strategic transformative industries* characterized by imperfect competition and with powerful interindustry spillovers. Fourth, continued techno-

logical development depends heavily on the connections between producing firms, their suppliers, and their customers. A web of structural and operating arrangements supports technological development, and that web can unravel. Fifth, this reshuffling of market position in a period in which important new strategic transformative sectors are emerging is powerfully influenced by government policy. Sixth, the reshuffling can result in new international hierarchies of wealth but also of power.

There are sound reasons to accept that a period of technological transition can resituate an economy and its potential for growth, but equally important to recognize that a nation's position in that transition can be strengthened or unraveled by policy. We argue here, of course, that we are in the midst of one such transition.

14

Policy and Competitiveness in a Changing World Economy

THE FRAMEWORK for debate must permit America to reorient its priorities and use government policy to help reestablish the competitive evolution of the economy. The difficulty is to make the policy discussion a concrete consideration of how best to use the multitude of policies America does have and will make. Far too often the debate is not about what policy to adopt, but about whether there should be any policy at all. In the United States there is a strong current of opinion, backed by a powerful and rich intellectual tradition and a long national experience, that holds that government focus on industrial competitiveness will only serve to make things worse. American political debate about the role of government in the economy is caught up in an unfunny fun house where ideological mirrors reflect distortions of intricate, but unproven theories. Three strands of argument in particular entangle the debate.

Finally, in the United States there has been a pattern of market-led growth in which there has been no purposive direction of growth and no explicit social bargain. Individual groups have won aid or protection, but not as part of or the price for a larger strategy. We have sought to protect corporate autonomy not exploit government leverage.[7]

Of course, in the last forty years we haven't needed to have an economic goal. We were confident that the unmanaged market was moving in the proper direction, because the outcomes favored us. We have been dominant. Nonetheless, we now must reorient our priorities and objectives if we want to retain our economic position. We must find a mechanism for confronting and making difficult choices. We must be able to debate analytically evident but politically charged truisms. For instance, we must confront the facts that raising national savings means reducing someone's consumption and that national investment today means savings from current consumption or borrowing abroad. If current consumption is to be reduced, does that mean that we must cut welfare or eliminate the deductibility of interest on consumer spending and housing? In the American system a reorientation will not mean just one set of decisions, however complex, at the national level, but an abundance of choices about schools and taxes throughout the complex federal system. A multitude of competing social objectives must be acknowledged and incorporated. The sheer diversity of decisions and choices to be made across the continent in state legislatures and local governments almost requires and demands a broad national agreement that we must make the adjustment to a changing world economy that our national hopes and goals require. We must build an American consensus.

The first step toward an American consensus is a framework for political debate that does not assign responsibility for America's problems on one group or require that certain groups adjust their lives so that others can carry on undisturbed. We must each abandon many of our sacred myths and think fresh about the problems we face. The framework of the debate must be constructed before the solutions can be recognized and selected. The framework—the way we define and order our understanding of the society in which we operate, the nature of our problems and their relative importance, and the scope of our options—is initially what matters most. Indeed not only does the framework—the optic through which we view the world—determine what choices and possibilities we see, but it often dictates our priorities as well. The framework and not the specific solutions is the concern of this book. Indeed, pursuing the quick fix or the magical solution is a means of avoiding the tough choices that reorienting U.S. priorities involves.

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Interest Group Standoff

First, some would have it that government and the clutch of special interest groups that steers government simply clog the machinery of the economy and prevent growth. An important image in American politics and a theme in our political discourse is that government cannot effectively act in the public or general interest and can only be an impediment to economic development. Politics, we are told, is dominated by narrowly drawn interest groups incapable of acting in any but their own particular and selfish interests. The government apparatus is a weak one, permeated by these organized groups and unable to articulate its own purposes and directions. The American government may be strong internationally in competition with other nation-states, but it is weak internally. Some formulations highlight iron triangles that link interest groups, congressional committees, and executive agencies. Policy is made, in these conceptions, fundamentally through an addition of special favors, through pork-barrel politics. This view has found formal exposition in recent years.[1] We are told that groups cannot act politically from common purpose and concern with public interest. The gains to a community that might be realized by members of a group acting together cannot be easily achieved if each person acts rationally. If the individuals that compose the group are rational, each will tend to act as a free rider and permit others to act on his behalf. Of course, if everyone is rational, then creating collective action is very difficult. The implication is that interest groups form only when there are concrete side payments that equate value added with the costs of participation. The very logic by which groups are formed means that they will use government selfishly and will tend to redistribute wealth through politics rather than create the conditions through which greater wealth is generated.[2] In a milder version of the same vision it is argued that the parties that aggregate interests have weakened; consequently there is a fragmented series of interest groups all trying to feed like pigs at the trough of government.[3] In both formulations, the result is that an accumulation of interest groups will generate a steadily growing number of private deals which distribute income rather than generate wealth. Interest groups are seen as the fat cells in a kind of economic arteriosclerosis. An accumulation of groups is held responsible for inflation and slow growth, stagflation, and sundry other economic ills. Indeed, in a peculiar kind of correlation, the destruction of interest groups facilitated economic development in Japan, France, and Germany; while the survival of interest groups through stable politics in Britain meant an inevitable economic slowing down.[4] Consequently, the

most important link between government and politics is a negative one. There is a policy consequence to this analysis. The best thing to do about interest groups is to limit them or their access to government, while the best thing to do about government is to keep it away from the market.

The theory behind these arguments is limited and, when applied to modern economic development, flawed and weak.[5] But most importantly, the record does not support the case that the advanced economies have been fouled in the undergrowth of interest groups and an excess of democracy.[6] In each fast-growth country a coalition for rapid growth and development was established. When, as in the case of postwar France, new purposes for government had to be established, a transformation of the groups active in politics—not a limitation of their numbers—was critical.[7] From a historical perspective, each change in the character of world markets and economy provoked tensions within the several national polities. Growth resumed when new bargains and solutions were worked out.[8] America's political problems do not stem from the slow buildup of interest groups that submerge the market. Rather, they have their source in America's unwillingness or inability to define its new political choices in the radically changed world economy and build political coalitions in support of innovative solutions on which growth can once again be built.

Markets and Strategies

The second notion that complicates American policy debate is, stated in its simplest form, that government cannot outguess the market. This completely misposes the problem. There are those who would simply try to force government out of the economy and leave our fate to their faith that, over time, the market will produce the best outcome. They rarely recognize that government, through the rules and institutional structures of the markets can and—as we argued in the case of Japan—does structure the dynamics of competition. Often those effects are powerful and positive. It is increasingly obvious that there is more than one form of market capitalism, and America's policy makers must recognize that differences in the role of government mean that there are several different market dynamics. Even a belief in the market cannot avoid the question of what markets we want to set up and what kind of market infrastructure we want to build in an era of rapid market and technological change. It is not a matter of

markets or politics, but of the precise ways that governments relate to business and structure markets.

Coming to terms with the role of government in an era of transition demands an understanding of how policy can shape a nation's position in international trade. Precisely because economic theory is concerned with static equilibrium, not with the dynamics of development, it is hard to find within traditional theory a basis on which a systematic and positive policy for competitiveness or development can be built. There are whole categories of exceptions to any conclusion that government can only distort market processes, but as each is an exception, it must be justified separately. The misleading consequences of the static character of such a conclusion is evident from an international and developmental perspective. Indeed, the powerful role of government in domestic economic development can best be seen from an international perspective. Governments can —and do—create enduring advantage for national firms in international trade. By enduring advantage we mean, again, a defensible competitive position that can be sustained after subsidy or policy measures to create advantage are withdrawn. The advantage need not, therefore, be arbitrary or temporary. Nor are the advantages necessarily limited to a few isolated sectors; indeed, they can influence the dynamics of an entire economy. Government policy can recast the position of the domestic economy as a whole in international markets.

This touches on a core notion that has shaped American policy debate, the forbidding doctrine of Comparative Advantage, remembered by the millions who once took Economics 101 in rather the same way Latin declensions are remembered by their parents. Revealed Comparative Advantage, to give it its full name, is the economic doctrine that addresses foreign trade. It tells a nation what its economy will specialize in: the British (because they wrote the text), in manufacturing textiles; the Iberians (because they believed it and lost), in port wine. A nation should, and will, find itself specializing in those activities in which it is the most efficient (or least inefficient) compared to all the others. Having a comparative advantage in something, say machinery or, better yet, complex manufacturing, does not mean that you are world class good at it or even better at it than the other guy. It means that you are just less worse at it than at other things. Your wage level tells you how good you are.

The American policy debate on trade is based on the prevalent view of comparative advantage in American economics. Our policy choices are framed by the notion that comparative advantage is revealed, not created. A nation finds its comparative advantage by looking backward in the trade statistics. It does not choose it by looking forward in its policy councils.

"Policy should not try to create comparative advantage." We are constantly told that nations that subsidize exports are only deluding themselves and, at the same time, subsidizing their consumers by lowering the price of the goods they import. Pull away the subsidy, and things will rubberband back to "normal." Enduring comparative advantage can not be created by policy.

It is of course true that, in a strict definitional sense, comparative advantage cannot be created. But saying that is a little like saying, as economists do, that foreign trade will always balance out. Prices simply need time and freedom to adjust. That is true, but nugatory. If, for example, the price of the dollar were permitted to adjust to the point where one dollar equaled one yen, we could sell the entire economics building at the University of Chicago, brick by brick, to the Japanese to use as disco space. The trick is not to balance trade; it is to balance trade at a high wage level. Similarly, a country always has a comparative advantage in something—that is the way the thing is defined. The interesting question is, in what? Can we keep it in activities that pay a high wage? Government policy, we argue, can to a significant degree move the list of its industries upward (or downward) in the hierarchy of value added. It can reshuffle its national list itself by influencing which industries are able to apply the power of the new transformative technologies to their products and processes.

What is comparative advantage? It is *not* the same thing as competitive advantage for a firm. Competitive advantage means that a firm can successfully sell its products in a given market. In economics jargon, this is called "absolute advantage." Firms have competitive or absolute advantage, nations have comparative advantage. What, then, *is* comparative advantage? The classic explanation is simple, but consistently misunderstood.

> . . . countries export goods which they produce most efficiently and at lowest cost and import goods that they produce least efficiently and at highest cost. A nation then exports in sectors in which it has a comparative advantage and imports in those in which it has a comparative disadvantage. A nation, of course, can have an absolute advantage in international competition in all sectors, but it will still—by definition—have a comparative advantage only in some sectors.[9]

Does all this get us anywhere? It lays the groundwork for analysis. The question is how interesting is the analysis? The answer is, not very.

The standard textbook example of trade uses a two-sector/two-nation economy, usually Britain, which has a comparative advantage in textiles, and Portugal, which has a comparative advantage in port wine.

According to the classic analysis, both countries are better off if each one specializes in the product in which it has a comparative advantage and the two countries trade with each other.

What the example fails to note is that Britain, with its advantage in textiles, becomes a richer nation than Portugal, with its advantage in port wine. If your comparative advantage is in bananas, a cheap, readily available commodity, then national GNP and per capita income will be less than if your comparative advantage is in numerically-controlled machine tool production. Many of the most successful of the newly developing countries understood clearly what American textbooks have not acknowledged; consequently, they have aggressively pursued policies aimed at altering the structure of their economies and hence their comparative advantage. Japan, for example, has consciously sought to shift the structure of its economy from one in which its comparative advantage was in labor-intensive goods to one in which it was in capital-intensive goods, and now to one in which its advantage is in knowledge-intensive goods and goods that require manufacturing expertise. If, by contrast, a nation's position in the high-value-added activities of an era erodes, its relative wealth will erode as well. Britain is the counterpoint example to Japan. Thus, it matters a great deal what a nation's comparative advantage is. This is another way of saying that the composition of a nation's trade matters.

How, finally, can we understand the link between the competitive dynamics of industry which we observe in the business pages of the daily newspaper, and the comparative advantage of nations, which we observe by analyzing their trade statistics? Is there a link between comparative advantage and competitive advantage? Recognizing the link will begin to illuminate how governments can influence comparative advantage through policy. Tyson and Zysman have pointed out:

> Whether comparative advantage is real or policy-induced at any moment in time, the competitive dynamics of industry form the link between static and dynamic comparative advantage. Over time, shifts in competitive advantage for particular firms in particular industries can accumulate into a change in national comparative advantage. The crucial point is that comparative advantage rests on the accumulation of investments, and that a long-run strategy can slowly alter a country's comparative advantage by altering its capital stock. Generous endowments of specific raw materials may give firms in one country a competitive advantage over international competitors. Thus in paper products, a firm with domestic access to ample timber resources will presumably have lower timber costs (a real Ricardian absolute advantage). In electronics assembly, cheap labor may give developing countries a competitive advantage in the labor-intensive phases of production (a real Heckscher-Ohlin absolute advantage). Port facilities give Japan cheap access to imported

raw materials required for steel production; in automobiles, an elaborate national policy to promote the components sector provides a substantial competitive advantage to all companies.

The main point, again, is that accumulated investment, whether in physical infrastructure or in the infrastructure of related markets and firms, is crucial to determining both competitive advantage and comparative advantage over time. In essence, a nation creates its own comparative advantage by the efforts of industries and government to establish competitive advantage in the market. Where the eroding competitive positions of individual firms unravel a web of infrastructure, the outcome can be a long-term loss in competitive advantage which amounts to a shift in national comparative advantage. This is especially true in industries composed of a few large firms. Although there may be no comparative disadvantage underlying the initial competitive difficulties of a particular firm, these difficulties can have a cumulative effect that leads to a national disadvantage. The costs of recapturing a lost market share will go up if the infrastructure, in the form of suppliers and distribution networks, is undermined. The collapse of suppliers may affect the industry's collective ability to sustain its technological position. As this discussion suggests, in advanced industrial economies, comparative advantage—a concept much in vogue and often loosely used—is to be understood as the cumulative effect of both company capacities and government policy choices, not simply as the effect of given endowments in capital, labor and resources.[10]

Policy can help to upgrade a nation's position in international competition in a substantial and enduring way. Like much in economic reality, but little in economic theory, the relationship is not symmetrical. Policy, all by itself, can hold back an economy that has most other things going for it: over the decades Argentina has been a recurrent reminder. But policy, however enlightened and astute can, by itself, only contribute to the upgrading process. It can't do the whole job. But the contribution can be very important.

The one thing policy is least able to do is to have *no* impact on a nation's competitive position. And that, of course, is what conventional American economics sternly prescribes for it. That policy cannot simply go away, or be "held harmless" in its impacts on the economy, is true not only for America, but for any complex, modern society. Like it or not, government affects the economy—both as a direct economic actor (taxing, spending, and often, doing) and as a set of all-pervasive and ever-changing rules. That truth is compounded by the fact that economic reality today consists of several large and complex economies that are all heavily policy-impacted. One nation's policies affect another nation's position. Were it achievable, policy neutrality in all nations might well be the best rule for the System as a Whole (though not necessarily for any one nation in that

system). In the absence of such universality, it loses any claim for being the best rule for any particular nation.

A Hierarchy of Policies and the Fear of Intervention

Creating advantage requires a systematic and sustained effort. The quick fix won't work. There is, though, a fear in the United States that acknowledging a powerful role for government in industrial development, let alone embracing a bold policy initiative, would lead to government entanglement in and direction of the daily affairs of American corporations or, worse, in the details of the affairs of the corner grocery. However, recognition that an active and positive government always plays a role in economic development should not lead to the conclusion that selective intervention—government mucking around with specifics of corporate strategy—is the only role possible. Understanding that this third element of America's instinctive distaste for government action to promote development is, at the least, exaggerated is essential for an intelligent policy debate.

There is a clear hierarchy of possible policies, which run from the most general to the most specific. (1) At the top are the aggregate policies addressed at objectives that will affect all sectors—macroeconomic stability or balance of payments equilibrium are examples. In principle these policies affect all groups in the economy equally, but in practice they powerfully influence specific sectors in very different ways. (2) Then there are the market-perfecting policies aimed at improving the economic infrastructure and the quality of inputs available to all firms in the economy. These include a collection of policies intended to improve the output of the market process by making the markets themselves work better. Policies to improve the working of telecommunications, transportation, or financial systems as well as policies to raise the educational quality of the work force or to encourage longer-term lending will affect the choices open to all firms. (3) At the bottom there are the policies aimed at dealing with the problems of specific sectors. Despite America's ideological distaste for industrial policy, the United States has an abundance of programs that do, in fact, have specific and intended consequences for a whole range of industries. They were not made, however, with attention to problems of international competitiveness.

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This hierarchy corresponds quite neatly with a ranking of policies based on their political acceptability—the more general the policy ap-

proach, the greater the political acceptability. The least general policies—and the least politically acceptable—are sectoral specific: subsidizing, protecting, favoring, or fostering specific sectors, industries, or firms.

The interconnection between the three types of policies in the hierarchy matters. We can all agree that the deficit should be reduced. That is a macro or aggregate policy. Reducing the deficit demands concrete choices about whose taxes to raise or whose programs to cut. Many of the mechanisms for implementing aggregate policies involve decisions that affect how markets work and the quality of the economic infrastructure. Similarly, problems in specific sectors often have their origins in the rules and resources in the economy at large. For example, the American semiconductor industry is composed of merchant firms that are smaller than their highly integrated and diversified Japanese rivals. Alliances between the companies to support research and production development, even while competing on product, may permit a competitive response. Whether those alliances are possible depends on the antitrust rules about how the market game should be played. Identifying the problems that firms face will help suggest how the market system can be improved by altering the rules and raising the quality of inputs and infrastructure. The fear that policy action to promote competitive development would mean an extensive and interventionist industrial policy is unwarranted.